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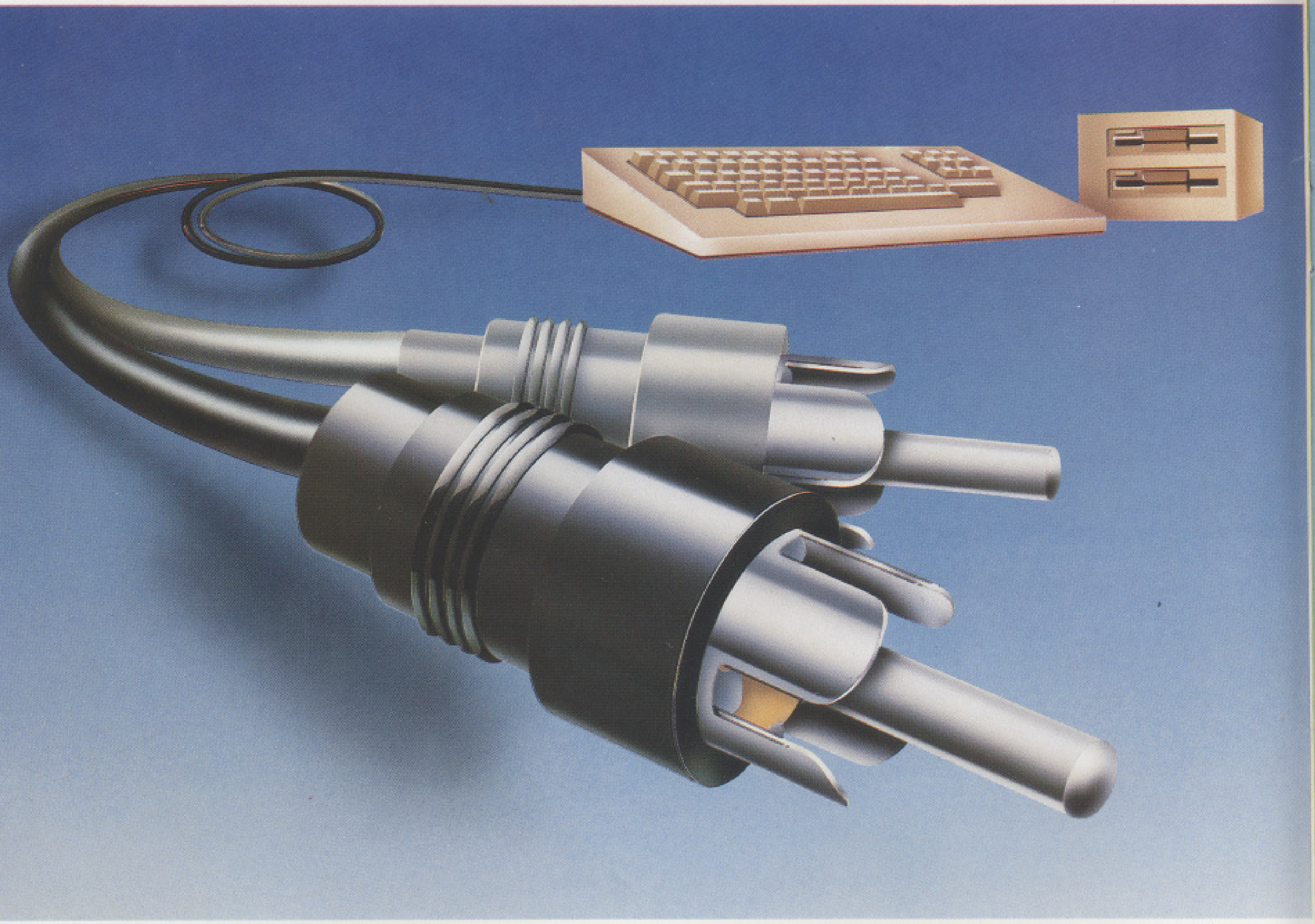

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April 1986

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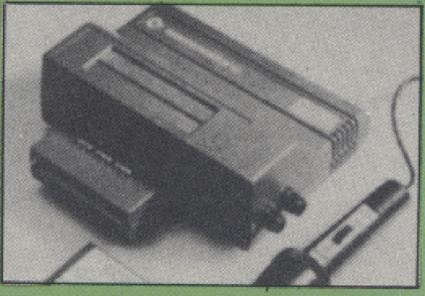

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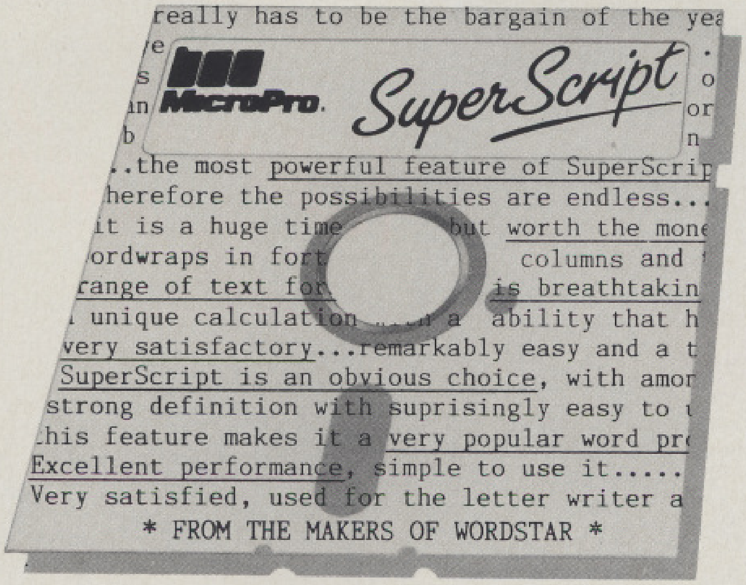

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...news ...news

The Hi-Technology And Computers In Education Exhibition 1986.

While most of Commodore were busy spouting the praises of the 'All singing, All dancing' Amiga at the Which Computer? Show in Birmingham, a few were at the London Barbican for the smaller, but much more specialised, Education Show.

Last year this show attracted 15,000 people, of which a large percentage are schools or users who will be buying computers not for their amazing specification, but for the software they offer.

However impressive the Amiga is, showing demonstrations of bouncing balls and high resolution animation is not going to sell the computer to schools who need it to control scientific tests in laboratory conditions.

Apart from the almost total domination of the BBC computers (with a truly amazing amount of new software), one good sign for Commodore was that there really was interest in their range of computers. Not only the Amiga, but the 64, the 128 – and also still importantly – the Pets.

With the huge budget they have, Schools must be convinced of the advantages of Commodore, otherwise the already shaky financial position it is in could get noticably worse.

When I asked the Commodore representative what, if any, educational software was in the pipeline for the Amiga – he seemed stumped and simply explained that the machine was new. This is not how to sell a product that, with the right software could fit in perfectly in such an educational environment.

On the 64/128 side there was some excellent looking networking systems and some well prouced software. If this will be enough to push Commodore harder into the educational market I'm not sure, but without software for the Amiga they are already pushing a lost cause.

Francis Jago

7th OFFICIAL COMMODORE SHOW

Commodore UK have commissioned Database Publications Ltd to organise and promote this year's official Commodore show. Unlike one recent show, this one WILL be held at the Novatel Complex, Hammersmith!

The show is aimed at all Commodore users, and naturally the amazing Amiga will be there.

CCI will of course have a strong presence at the show, which is set to run from the 9th to the 11th of May.

Comments...

Dear Reader,

This month sees the announcement of the 7th Commodore Show. It looks from early reports likely to be the best and most interesting yet. It is important as a showcase for everything for Commodore Computers, whether for owners or suppliers.

CCI is preparing its own contribution to the show which will contain lots of benefits for our readers. So watch for the news of the Show in forthcoming issues of CCI.

No doubt at the Show there will be the stands of all the companies who sell Commodore games. Just a short while ago, there was a multitude of games houses. Taskset, Romik, Redshift and many others were once powerful, well-known names in the shops. They have disappeared in the software industry shake-out of the end of 1984 and throughout 1985. It is still going on with the company that owns Adventure International this month announcing it is going into liquidation.

Many other games houses have also gone, but their labels have been bought up and absorbed into a small number of companies. The real spread of games house ownership has been substantially reduced to the growing power of four or five major organizations. Some of them own six or more labels under which they release games. Those organizations, it seems, are already controlling an extraordinary proportion of the games market, and it may grow. Is this good for the Commodore owner?

Some would say that there were too many small companies producing poor material and in a 'market economy' the weak go to the wall. But there are others who doubt that this narrow dominance is the best thing for the buyer. They feel that the lessening of real competition may well limit choice and quality.

The big battalions have obvious advantages in resources for marketing and selling, but large organizations are not always renowned for their creativity, nor for their willingness to step away from the conventional and try something new. It is also generally recognised that too much power in too few hands is rarely good for the consumer.

For those who are concerned by the trend toward concentration of the market, I can say as an independent publication, CCI sees one of its tasks as offering you the information and knowledge that will give you the greatest freedom of choice, especially at a time when it may be in danger of being limited.

Yours sincerely,
Antony H Jacobson
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NEW COMMODORE CENTRE

Gultronic, the largest independent Commodore dealer in the UK with a turnover of more than 10M, has just opened a specially equipped Commodore centre within their Tottenham court Road branch in London.

Convinced that Commodore are the company to stay with, they have invested £25,000 in the centre. Let's hope that it succeeds!

Gultronic director, Sam Tulsiani, says:"Commodore products are of a high standard, with a good range and the company is stable, that is why we decided to invest in the centre."

COMPUTER USERS LIST

Kingsgraphic, a Hampshire based company, is forming a list of computer enthusiasts – to enable them to get in touch with like minded people. The register is designed to be especially useful to people with modems.

To get in touch with Kingscraft and become a part of this excellent idea, contact them at the following address: 29, Seymour Close, Chandlers Ford, Hants SO5 2JE, enclosing an SAE.

WAPPING BLOW!

Although Mr Murdoch (Rupert to his Pals) is claiming the glory of hi-tech printing left, right and centre, he has also experienced the annoying side! Having equipped all the reporters on the times with little portable computers to enable them to send copy down the phones, he has had to revert to good old fashioned methods. Why, I hear you cry? Mainly due to the fact that the computer to receive all these calls is in Grays Inn and, as we all know, Murdoch is in Wapping.

Ahh well!!

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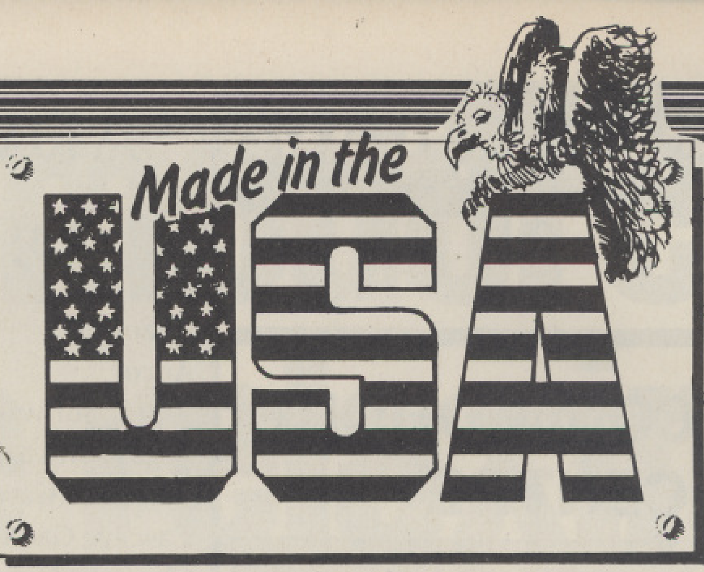

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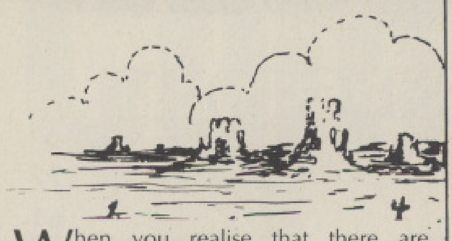
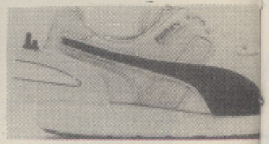




When you realise that there are probably more Commodore and other computers in the US than in the rest of the world put together, you understand why most computing products start and spread outwards from here. No matter how creative other countries' programs and designers can be, the sheer size of the US market dominates world demand both in home and business computing.

That is not to say non-American products can't make it here,especially in the games world. A couple of games created in the UK are bringing screams of delight coast to coast. Mastertronic, the international low price label, has released disk versions of Golden Talisman and The Last V8 for just $9.99 each. They're selling like crazy. One of the American games producing a furore here and not yet released abroad is Infocom's big new 128 adventure: A Mind Forever Voyaging. This is their largest adventure yet, with 200 rooms and a vocabulary of 1,700 words.

Big games

Electronic Arts have released a sequel to their award-winning Seven Cities of Gold: Africa 1890. Stomping your way through the Dark Continent, you inherit the diary of a madman and set out to find the tomb of a pharaoh. It's no pushover as you have 11 million square miles crammed into your computer. On the way you've got to steer up 17 rivers, sail 10 cities, learn the ways of 22 tribes to say nothing of hacking through jungle and swamp, and exploring deserts and mountains. Its's all claimed to be geographically accurate!

Surfing is big here, especially on the west coast, and Surfer Magazine has brought out an arcade style game where you control a surfer riding the waves of a stormy sea. I get seasick on a ferry boat, so I haven't tried it, but they tell me it's got the 'real life dynamics' of surfing. If that's what turns you over……

A new idea from Activision is the Computer Firework Kit, with which you can build your own Fourth of July whizz-bang display. Still a top seller is Night Mission Pinball, winner of the Electronic Games Arcade Award for Computer Graphics as long ago as 1983.

Two games not yet on the market but tipped as humdingers are 'The Halley Project', which puts the player in command of a space ship as it navigates through what they claim is an accurate simulation of the solar system; and 'The Other Side' , a complete world crisis challenge between two superpowers. The game has been designed, very appropriately, to run on two different computers at the same time in separate locations. The two computer option means players use a modem and can play without ever being in personal contact with the opponent. Tom Snyder, the designer, says its objective is to make peace, not war. Copies to be sent to Reagan and Gorbachov A.S.A.P.

Flight simulation in the US has buzzed off into the wide blue yonder. Two highly complicated simulations seem to be spearheading the field. The newly released JET (just available I hear in Europe) and Stunt Flyer, which lets you into the recondite airborne world with such aerobatics as Immermans, Hammerheads and Cuban 8 turns and rolls (I can't even think of what a Cuban 8 roll is without getting queasy!). A third solid simulation seller is Microjet. An interesting and successful simulation add-on idea is Sublogic's Scenery disk. The contour and geography-accurate disks cover the entire continental US including faithful representations of major airports, audio-navigational aids, cities, highways etc. Each disk of a particular area – there are 12 in all – will set you back $19.95.

Apple emulation

The US Commodore owner has an insatiable appetite for other add-ons, too. You can now get access to the huge amount of soft and hardware available for Apple II computers and use it on your 64 or 128 through an Apple II emulator. And they throw in an extra 64K ram, four selectable C64 cartridge slots, a non-dedicated 8 bit parallel port and the use of standard audio cassette decks. But that little lot will throw you back around $500!

A new program has been published by Timeworks that lets you print out standard spreadsheet programs sideways – wider than your printer paper. Some very well regarded integrated home and business software is being produced by Tri-Micro in California that covers the Plus/4 as well as other Commodores. There is also a new cartridge expander that plugs into the cartridge slot of the 64 and permits use of up to three cartridges at a time. Fischer – Technik have launched a robotics construction kit at $199 that includes everything to build robots to teach computing, process materials, sort objects, compute graphs, and it has a solar cell that tracks the sun. Sublogic are selling for $49.95 a utility back-up program that literally takes a 'snapshot' of a computer's memory. It's been called 'the hacker's delight'. I leave you to guess why.

QuantumLink

If, on the other hand, you would rather hear the info straight from the horse's mouth, you can go through Commodore QuantumLink (Link, Sir Clive, not Leap. Ed). QuantumLink is an interactive videotex network that among other things lets you put questions and queries direct to Commodore's own designers and executives. Obscenities get deleted I suppose.

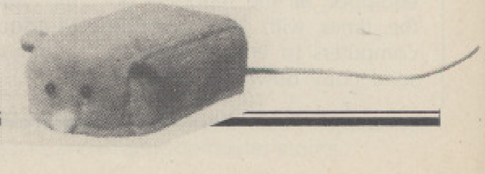
You may be surprised to learn that the somewhat antiquated Pet is still on sale here at around $750. But Plus/4 owners elsewhere would find the machine better served here than in most countries. Commodore alone has more than 60 software titles available for the Plus/4, including games like 'The Hitch Hiker's Guide To The Galaxy' and The Zork Trilogy. Trimicro is running a Plus/4 Club.

The printed best seller of the moment is Howard Sams' "Official 128 Book". However it would not be the good old US of A if there were not some real bananas around. How does it grab you to munch edible computer 'chips'? They are excellent reproductions of the silicon real things, but made of chocolate, for eating not computing. And are you a jogging buff? Then what bout a Puma Computer Training sneaker? The shoe has built-in an electronic sensor and stop watch to record your distance and time. When you stagger into your home, you can plug it into your 64 or 128 and it will come up with encouraging programmed graphics and other information to chart your progress toward fitness! And, believe it or not, they've come up with the computer equivalent of the Pet Rock! It is a coloured, soft material cover, complete with eyes, nose and naturally even a gap for the cable 'tail', all to keep your sweet little electronic 'mouse' from the cold. Made, where else?, in the USA

Joe Gene Parris

Next month our US correspondent covers more 'Made in the USA.' and discovers the Computerised Politician.

Only in America – a soft cover for your mouse! (Top: Computer training sneaker)



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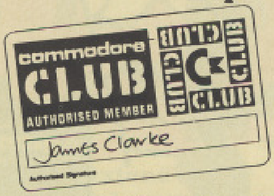
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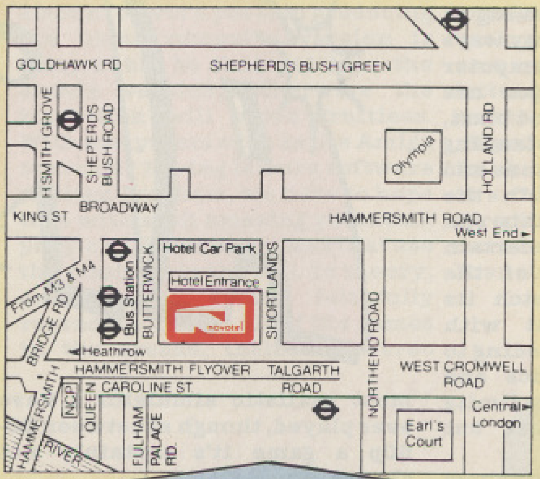
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SEGA
7
HANG-ON

Amazing ARCA

A few years ago, a lot of my spare time was spent wandering aimlessly around arcades. Recently I decided to return to my old haunts to see what's changed. Everything!!!!! Las Vegas, one of the best and most up to date arcades in the West End, together with The Crystal Rooms, have really gone hi-tec. No longer are there new machines side by side with old favourites. In all my travels I only saw one or two Defenders.

Atari, still one of the largest arcade games producers, use their fabulous System I to produce games of consistantly high quality that have been wowing everyone in the arcades for months. Games such as Paperboy and Gauntlet (more on this one later) fully utilize the amazing graphics. I am reliably informed, however, that Atari are soon to release a high resolution Paperboy using a new system (imaginatively called System II). If they call Paperboy lo-res, then I have to see the new one, it should be totally awesome!!!

What seems to be happening in the arcades reflects in many ways the general state of the computer games market; no longer are people satisfied with a good blast, now they need outstanding graphics, catchy theme tunes and realistic sound effects. In the home computer market this can only be achieved to a certain degree – though some of the products on the 64 stretch its limits amazingly – but with arcades machines only needing to do one task, the graphics and sound can be stretched to limits that do not only impress but astound!

In my view, the best way to show the recent developments in the arcades is to tell you about a few of my personal favourites, not necessarily the newest games, but definitely the best!

Perhaps the most noticable game in any arcade is the full – ride on – version of Sega's 'Hang-On'. Being an avid motorcyclist, and until recently the proud owner of a 350 powervalve, this game had me hooked right from the beginning. Although people have criticised it for being little more than a glorified Pole-Position, I believe that the specifications of this machine prove how brilliant it really is.

'Hang-On' can be played by anyone who has ever watched a motorcycle Grand Prix and wondered what it must feel like. To do really well you must lean the simulator left and right, as well as a combination to wizz through the chicanes. Graphically the game is excellent, with attention to detail being obvious throughout. Touches such as the racers with whom you compete having working brake lights make it truly realistic!

To produce a game of this standard, with backgrounds of this detail, smoothness of movement, and sampled sounds (in stereo too!!) takes some pretty impressive hardware, and 'Hang-On' certainly has it! To control the program it has two 16-bit and one 8-bit processor – to put that into perspective, that's the power of two IBM PC's and a 64! It has 512K purely for graphics, with another 32K for colours. The actual program is 192K long, and the stereo sound and music are independantly controlled.

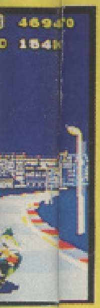
All this combines to provide the most realistic simulator I have ever played, though at between 30-50p a game it's certainly not cheap!

Bouncer is the newest game from new company, Entertainment Sciences, and from what I have seen and heard they ought to be around for quite a while! Bouncer is the first game I have seen from them, and uses a pretty novel setting as the storyline for the game.

As the 'Bouncer' for the Ritz Bar, you must keep control over the cast of characters, making sure that any trouble makers are dealt with. Using a trackball, as pioneered on Missile Command, the movement is ultra-smooth. Entertainment Sciences promise to put out a new game every six months on the system used to create this game – RIP (Real-time Image Processor). This system again uses three processors and has more than a mega-byte of memory (four times what the Amiga comes with as standard!).

Nemesis is the newest game from Konami. As it has only just been released I have yet to see it, but from what I've heard, and the screen shots I've seen it should be really impressive – to say the least, with some really clear high resolution coloured graphix to aid your travels through outer space. You play Captain Nemo, and must discover the lost Armada!!

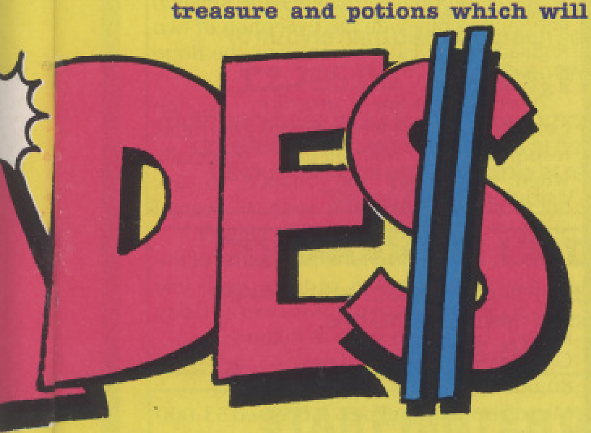
If you go into an arcade at the moment, and there is one



machine with a bigger crowd around it than any other (by miles if I'm there!), the game causing this stir will, more than likely be 'Gauntlet' by Atari. As a game 'Gauntlet' dates back to a very early Atari 800 game, in which up to four players could travel around a maze, killing various baddies. Recently it has been converted to Atari's System 1, and now it's fabulous!

Gauntlet is a 'Multiple-player' game, meaning that up to four people can play each taking on the role of an individual character (Thor the Warrior, Thyra the Valkyrie, Merlin the Wizard or Questor the Elf), either helping each other, or hindering!

The actual object of the game is to survive attacks from the wide variety of monsters while competing for various food, treasure and potions which will help you extend your game. Longetivity of your life depends on your 'Health', which decreases as time goes by, as well as if you touch any of the monsters.



Graphically 'Gauntlet' is truly superb. Although it is 'only' an Atari System I game, the characters are really well defined, each having his or her own features – speed, armour, weapons, etc. The way to really make the most of 'Gauntlet' is to get a group of friends together, go to your local machine and have a team game, blasting your way through to level 8. The sound is also really excellent with great speech that really has a function (including telling you which of your team made the mistakes with phrases such as "Wizard shot the food"!).

In my view, 'Gauntlet' is the best arcade game around at the moment. Being able to join in a game at any time, irrespective of what anyone else is doing, means that many people can learn to play the game faster – and meet other 'Gauntlet' fans.

The last game I want to talk about is more a genre, rather than one type particular game. In the last year 'Trivial Pursuits' has been the biggest selling game in the world, by miles! It was, therefore, only a matter of time before someone decided to put the test of the irrelevant into the arcades! Surprisingly it has almost immediately become a success. In the Crystal Rooms in Leicester Square, people were testing their knowledge almost constantly, even at 30p a go.

Only in pubs have I seen machines such as Ace's Trivia, where it is possible to win money by being knowledgable (though I think it's probably a great deal cooler to lose!)

That the arcades affect games produced for home machines is an undeniable fact – Elite's recently released Commando was a direct conversion from the hugely successful arcade game, and Ocean (or rather Imagine) have signed a huge deal with Konami for the rights to convert games such as 'Comic Bakery', Ping-Pong' and 'Mikie'.

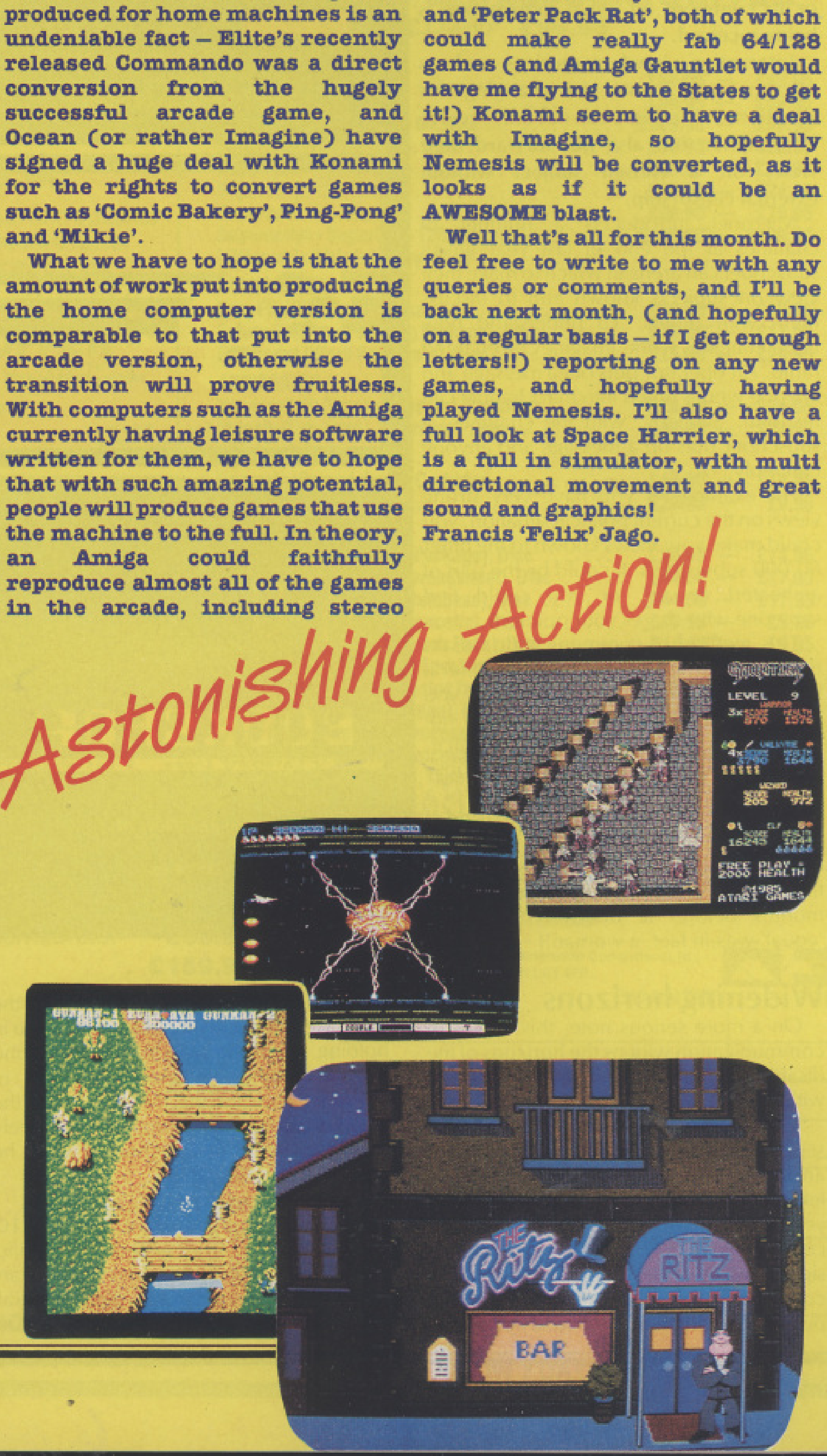
What we have to hope is that the amount of work put into producing the home computer version is comparable to that put into the arcade version, otherwise the transition will prove fruitless. With computers such as the Amiga currently having leisure software written for them, we have to hope that with such amazing potential, people will produce games that use the machine to the full. In theory, an Amiga could faithfully reproduce almost all of the games in the arcade, including stereo sound, but will people be willing to put in the amount of time and effort required? I'm not sure, but I really hope so!

Finally I'd like to give you my tips for what will be the hot conversions of mid to late '86 – maybe even earlier (if companies get their acts together). Capcom's latest arcade game, 'Gunsmoke', which looks amazingly like 'Commando' with a western backdrop (although I'm assured that the firing method is revolutionary), should be released soon, perhaps by Elite?

I can't see anyone doing justice to 'Hang-On', but maybe someone will try. Atari must soon realise the marketability of 'Gauntlet' and 'Peter Pack Rat', both of which could make really fab 64/128 games (and Amiga Gauntlet would have me flying to the States to get it!) Konami seem to have a deal with Imagine, so hopefully Nemesis will be converted, as it looks as if it could be an AWESOME blast.

Well that's all for this month. Do feel free to write to me with any queries or comments, and I'll be back next month, (and hopefully on a regular basis – if I get enough letters!!) reporting on any new games, and hopefully having played Nemesis. I'll also have a full look at Space Harrier, which is a full in simulator, with multi directional movement and great sound and graphics!

Francis 'Felix' Jago.



Have Modem — will communicate

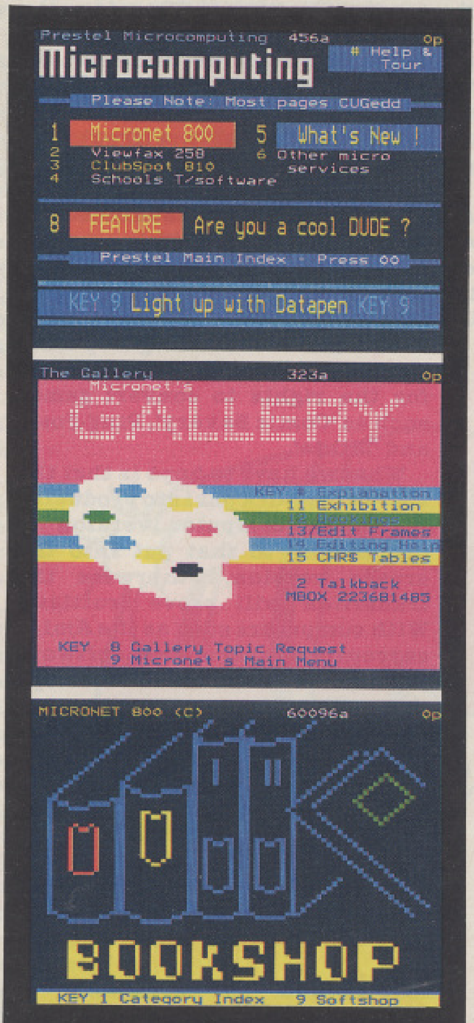
Speed in the delivery of information has been the main consideration of communications technology in recent years. This has led to far greater access to news, but in a country which boasts of free speech there have been few opportunities for the ordinary person to be involved in, or to comment on, what information is being received.

Interactive viewdata services such as Micronet and Prestel are changing this situation. Subscribers can not only receive information, but also put forward their views on a chosen subject without external censorship.

Micronet introduced a number of chatlines at the end of last year giving subscribers an arena in which to make their view on subjects known and to discuss them with others. To understand how these chatlines work, imagine Citizen Band radio. An operator puts out a message and anyone who is tuned into that channel can respond. Similarly, with the chatlines, a subscriber puts up a message and anyone can reply.

For example, if you have very strong views on the current political situation, you could make your views known to the other 80,000 subscribers. It could be the start of a heated debate, or you could find someone who shares your opinions.

This method of communication breaks down the barriers of prejudice, whether it be social or racial. When you communicate via a chatline, you do not know your fellow subscribers sex, race, age or social standing – unless they choose to tell you so. (Indeed I have heard of a confirmed male chauvinist who boasted of his new found micro pal with whom he enjoyed intelligent conversations about the finer points of computing. It was several months before he discovered that his 'equal' was, in fact, a woman!)



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Illustrating just a few of Micronet's services.

Widening horizons

On a more serious note, this means of communication widens the horizons of the disabled and allows them greater contact with the able-bodied.

It has certainly been a godsend to seventeen-year-old John Bye. Involved in an accident at the age of eleven, John was left disabled and non-vocal. For the first year after the accident, he could communicate only through a self-taught sign language. John then got a Cannon communicator which enabled him to punch out what he wanted to say on Ticker tape. This was frustrating in terms of the time taken to tap out a message and also in holding peoples attention. In 1983, John and his father became members of Micronet and, for the first time since the accident, John can communicate freely with his father from the school at which he is a boarder.

Micronet currently have around 10 chatlines ranging from general to specific subjects. Two Daisy chatlines provide an arena for general topics and general computer conversations. Messages are achived for up to 100 messages at a small cost.

A further two Quickchat lines cater for general computer talk and micro specific subjects. Then there are politics, religion and gay lines.

Quickchat Gay line has quickly established itself as the most popular of Micronet's chatlines with 10,000 accesses during its first week on-line without any advance publicity.

The least popular chatline is the Religion line, apparently with the exception of two regulars – The Fat Nun and Eric the Bone (Hmmm!?)

Another on-line attraction is the Celebrity Chatline which brings enormous response from Micronetters, especially when they have the chance to ask questions of a pop star such as Feargal Sharkey – a Micronet member himself.

As an indication of the popularity of the chatlines, the number of times each line was accessed was monitored over a 10 day period. The results were as follows:

General Quickchat lines – accessed 80,000 times
Micro Specific chatlines – accessed 53,000 times
Gay lines – accessed 25,000 times
Politics chat lines – accessed 15,000 times
Religion chatline – accessed 13,000 times

A forum for conversation

All the chatlines enable subscribers to contact like-minded people. In addition to providing a forum for serious conversation, chatlines can combat loneliness and establish new friendships.

Micronet is a 24-hour service and insomniacs have a special spot of their own, the Midnight Micronetters. Late at night these people meet on-line to chat away the midnight hours. Interestingly, it is this line that is most used by members of both sexes.

If a subscriber wants to take his pet subject further, then the option is there with Gallery. Here members can produce and design their own magazine with a potential audience of the total membership base.

Chatlines are only a small part of Micronet and the communications world. We will be keeping you up to date with the latest developments in future issues. Until then, log on and keep chatting!

For more information on Micronet, ring 01-278 3143

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MOVIE SCENE

ROCKY IV (PG)

Most of us stopped believing in Santa Claus a long, long time ago. It seemed just a *little* passe to have a penchant for fairies,witches and such. But you may just want to resurrect those old associations for Rocky IV.

There's little point in relating the plot......if you've read Jack and the Beanstalk, you'll know the score. The little guy takes on the invincible dragon (or Drago in this case) in the cause of truth, right and justice.... except this particular Wicked Witch of the West (or the "Siberian Express" as he is affectionately known) carries enough muscle to be charged for excess baggage.

Sylvester Stallone's current stable of screen gladiators, Rocky and Rambo, like all heros of old, need sagas of causes fought and battles won. And while battling away, both display the same flaw. Stallone's offerings now owe much to the Brothers Grimm (and Grimm is a pretty apt description of Rambo). The basic predictability which makes escapism so appealing here becomes trite and clinched to the extent where it becomes unintentionally comic.

The heart of a good tale is that it creates a tangible dream. It evokes the exciting, the unattainable, the fantastic. The Rocky Quartet tapped this successfully, but the weaknesses of the latest offering suggests that its time for our All-American hero to retire after slugging it out in parts 2,3 and 4 .... and that goes for Rambo too (and 3 and 4).

If you love Hans Christain Andersen, you'll love this.
S.G.

CAPTION: Your round or mine? (Is it Drago's career or his vodka that's on the rocks?)

YEAR OF THE DRAGON (18)

Michael Cimino is known for a certain type of direction – violent – and, in Year of the Dragon, he certainly lives up to his reputation.

Mickey Rourke, in my view one of the best actors to come out of America recently, plays Captain Stanley White, a "tough New York cop". Having made a reputation for getting his own way, Stanley is assigned to "clean-up" an ever increasingly violent Chinatown.

Perhaps this is where the film starts to lose its way. The conflicts between Stanley and both the gangsters and his superiors seem to pale in comparison with the overall unpleasant feel of "if it's yellow, kill it!".

Year of the Dragon is a film that involves the viewer very easily, and as such provokes criticism. Rourke was not the perfect choice for this film – his talent is too raw, yet somehow he manages to drag you down to the level of animal instinct.

This film is an extremely fast paced thriller, it has its failings, but overall it is involving and enjoyable. **FKJ**

Captain White reacts in typical fashion!

A ZED AND TWO NOUGHTS (15)

Reality is not, as someone said, easy to live with, nor is it easy to watch if it is the tortured reality of a film director who has been hailed as a wayward genius. Peter Greenaway made a sensational debut into bigtime movie making with 'The Draughtman's Contract'. It was a cold, vicious murder mystery set in 18th Century England. You either loathed or loved it. I know one girl who has sat mesmerised 12 times through the video. I found its wild imagination and sharp intelligence fascinating enough to manage three time viewing, but eventually I found Greenaway's inhuman view of unpleasant reality too chilling.

His new movie goes a step further in demanding belief in the incredible, but he succeeds by the sheer technical brilliance of a film that will undoubtably take its place among required viewing for any moviegoer in search of directorial excellence.

Prepare yourself, however, for the extraordinary. The wives of twin zoologist brothers are killed in a car accident caused by a low-flying swan. (A swan? Are you serious? Ed). The driver, a beautiful European woman loses a leg in the accident and subsequently – and possibly unnecessarily – the other is amputated too. The two brothers both fall in love with the mysterious amputee who later bears their twin babies. The twin zoologists also become obsessed with death and decay and film the process of change in animals from the zoo. When the legless mother of their children dies, they commit suicide.

There is also a number of very peculiar minor characters to add to the bizarre atmosphere. I told you Greenaway had a tortured imagination!

If film technique interests you, this is not a movie to miss. The camera work is outstandingly clever, particularly the speeded-up film of change in the zoo animals, which is probably computer controlled. In fact, it all resembles a totally machine-made film. It is as if a computer had been programmed with a random selection of different elements, given its technological head and come up with a disconcerting, inhuman combination which is being presented as a 'normal' movie.

Could Mr. P Greenaway himself be a figment of some computer's movie fan style artificial intelligence? Is 'A Zed and Two Noughts' about the duality of personality we all possess, or is it really about the process of film making? See it yourself and decide. Don't ask me, I've only seen it once – so far. **A.J.**

A bizarre character from a bizarre film.

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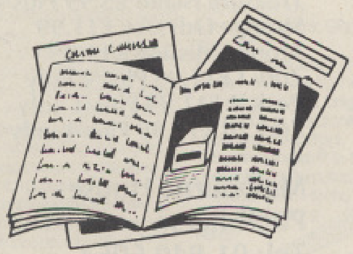

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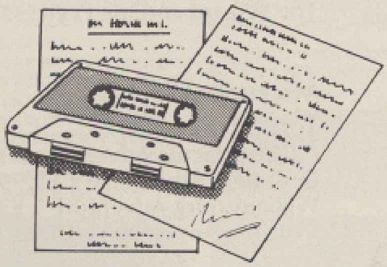

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on C16 + Plus/4 products

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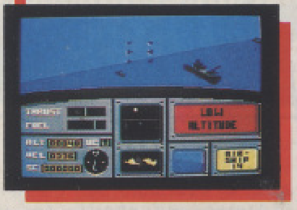

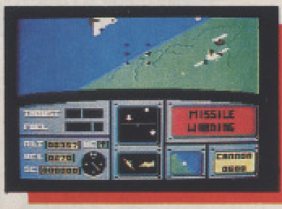

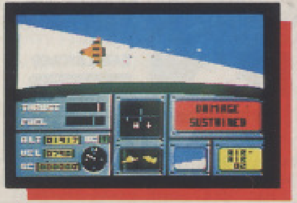

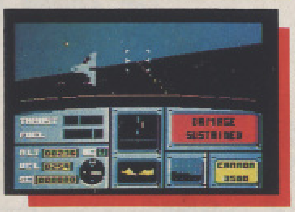

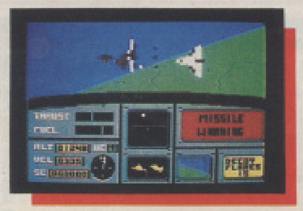

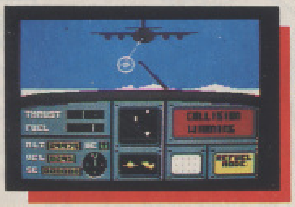

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Insights Into the Plus/4

PART III

Aspects of RS232 are the main subject covered by Bill Donald in this month's insights into the PLUS/4

Oops, red face time; I gave you the pin-out details of the PLUS/4 Expansion Port in the first article of this series (see January 1986 issue) but somehow forgot to include the pin-out diagram. You will note that it is similar to the VIC-20 and C64 ports with the exception of additional pins, taking the total up to 50. The main reason for this appears to be prevention of using the incorrect external card.

Upper Row

25	24	23	22	21	20	19	18	17	16	15	14
@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@	@@@@

13	12	11	10	9	8	7	6	5	4	3	2	1
@@@@	@@@@	@@@@	@@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@

Lower Row

CC	BB	AA	Z	Y	X	W	V	U	T	S	R	P	N
@@@@	@@@@	@@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@

M	L	K	j	H	F	E	D	C	B	A
@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@	@@@

I had intended the previous article to be the last on the PLUS/4, but the Editor had deemed otherwise because of the interest these earlier articles had generated, so here I am again. I think I should make it clear that a good deal of this series is applicable to the C16 although there are two reasons why I have not been more explicit over this point. The first is that the C16 is essentially an entry-level machine and I have assumed that the purchasers of the C16 would not have the necessary knowledge to follow the series. My apologies if I have upset readers over this. The second and most compelling reason lies in the fact that I do not have a C16 and because of this I have no experience of exploring the operating system on it!

I have had a number of letters, mailboxes and personal discussions with PLUS/4 users who in the main want to know more about the RS232 abilities and general Commodore program compatibility of the machine. Unfortunately, there seems to be a general impression that the PLUS/4 will run C64 software and this is being used by unscrupulous or uninformed dealers to sell PLUS/4's. This not true and clearly the dealer is in breach of the Sale of Goods Act. You should always insist, nay demand, a demonstration of any hardware and/or software configuration that you intend to buy. If it doesn't work properly or does not fulfill what you intended it to do then forget it, once the money has been handed over your position begins to weaken. Similarly, if you buy software on mail-order make it very clear IN WRITING what equipment you have and what you want the software to achieve, keep a copy of this.

OK, back to the PLUS/4 and RS232, I believe this started life as a communications protocol standard for data transmissions over telephone lines. Unfortunately, over the years the standard failed to keep pace with changes in hardware engineering and has become corrupted, some would say hopelessly, between different manufacturers of computers. Commodore themselves are as guilty of this pattern of degradation of the RS232 standard as anyone, although they would probably use cost as the justification. Where the Commodore home computers differ from the standard lies in operating voltage levels. The VIC-20, C64, PLUS/4 and C/128 all have their RS232 interfaced at the User Port – note that this is not possible with the C16 due to the lack of a User Port. RS232 voltage levels are +12 volts and 0 volts, whereas the voltage available on the User Ports is only +5 volts and 0 volts, in other words, TTL voltages.

This voltage level problem is not too important if you were interfacing one of the above-mentioned machines, provided that distance between the machines was kept to a reasonable length, realistically no more than 1 metre. The reason for this being that 5 volts is not a very great pressure and a voltage drop of more than 1 volt is going to cause signal mis-interpretation. The distance could be extended a little if heavy section conductors were used, ie 240 volt 13 amp cable, but you would then have the problem of trying to solder this on to the connector pins, very messy. If distance between the two Commodore machines was too great the best solution would be to buy a ready made RS232 interface for each which brings the voltage level up from TTL and for interfacing to true RS232 machines this would be essential unless you wanted to destroy the circuits within the Commodore.

There are any number of ways in which to lift the voltage up from 5 volts to 12 volts, and I mentioned in the last part of the series using the 1488 and 1489 line drivers and receivers. These are integrated circuits specifically designed for RS232 work and represent the most elegant way of doing it yourself since they cost less than £1.00

each. It is beyond the scope of this article to delve too deeply into the construction and use of circuits using components and I would suggest that you look in the direction of electronics if you are interested further.

The PLUS/4 RS232 facility is controlled by an ACIA (asynchronous communications interface adaptor) circuit located between addresses $FD00 (64768) snf $FD0F (64783). Because the PLUS/4 uses a true ACIA as opposed to a virtual one in the VIC-20 and C64 (these use internal KERNAL procedures to emulate the presence of and ACIA) there are considerable differences between the facilities offered to the programmer. The information that follows is strictly applicable to the PLUS/4 only, unless otherwise indicated. Also in the interests of clarity I will adhere to using BASIC where possible on this occasion.

The 6551 within the PLUS/4 is operated through two addresses, namely $FD00 and $FD01, these are the control and command register locations. The RS232 vectors are located at $07CD (1997) to $07D8 (2008).

The control register can be broken down into the following:-
Bit 7 number of stop bits
Bit6/5 word length from 8 bits to 5 bits
Bit 4 use internal or external clock
Bit3 transmission rate (baud)
Bit 2 ....ditto........
Bit 1 ....ditto........
Bit 0 ....ditto........
The command register is structured like this:-
Bit 7/6/5 parity type
Bit 4 duplex mode on/off
Bit 3/2 transmitter interrupt handler
Bit 1 receiver interrupt handler
Bit 0 data terminal ready

An explanation of these register functions is complex and difficult to comprehend, however, for those readers who are interested I'll keep it simple. When data is transmitted using RS232, it is sent on a serial bus consequentially the ACIA has to be told the length of each 'packet' or word of data, the number of 'stop' bits used and which type of, if any, parity is used. Parity is an error detection routine and is described as odd or even. Duplex can be thought of as data verification by means of echoing back to the transmitter unit the data words received. It is not really necessary to go to deeply into the various permutations that can achieved and sticking to standard transmission protocols is recommended, for instance the register configuration for basic ASCII transmission is 7 bits, even parity. For general details on programming the 6551 refer to '6502 Assembly Language Programming' – Leventhal – ISBN 0931988276 and '6502 Assembly Language Subroutines – Leventhal & Saville – ISBN 0931988594.

If you want to program the 6551 within the PLUS/4 using machine code you should realise that the KERNAL routines of SAVE and LOAD are not permitted for device 2, the RS232 port. Details of the RS232 vector locations are as follows:-

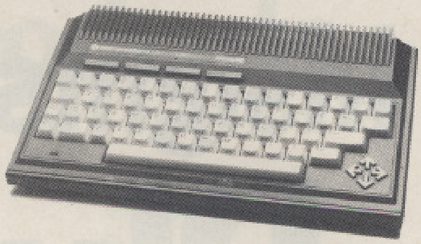
$07CD 1997 UOUTQ User character to transmit
$07CE 1998 UOUTFG Flag for above : 0=empty 1=full
$07CF 1999 SOUTQ System character to transmit
$07D0 2000 SOUTFG Flag for above : 0=empty 1=full
$07D1 2001 INQFPT Pointer to front of input queue
$07D2 2002 INQRPT Pointer to rear of input queue
$07D3 2003 INQCNT Number of characters in input queue
$07D4 2004 ASTAT Temporary status for 6551 ACIA
$07D5 2005 AINTMP Temporary status for input routine
$07D6 2006 ALSTOP Flag for 'local' pause
$07D7 2007 ARSTOP Flag for 'remote' pause
$07D8 2008 APRES Flag for ACIA 6551 present on current address space

There is also an extension to these vectors, a buffer running from $07D9 (2009) to $07E4 (2020) which appears to be for download routines, which I would guess to be such things as system protocols or program header data. The RS232 input queue buffer starts at $03F7 (1015) and finishes at $0436 (1078).

The BASIC syntax for OPEN and CLOSE a channel to device 2 is unchanged from earlier Commodore machines. However, you can make use of the PLUS/4 by incorporating the extra bit values of the control and command registers. For information on programming in BASIC the RS232 facility on Commodore home computers refer to page 348 of the C64 'Programmers Reference Guide'.

The User Port RS232 pins are on the UNDERSIDE of the PCB and this configuration does not differ from other Commodore machines. I have listed below the details of the PLUS/4 RS232 port and modes available:-

Pin Assignment Description Mode
A GND Chassis Ground 1 2
B ACK Received Carrier Signal Data 1 2
C PB0 Received Data 1 2
D PB1 Request to Send 1* 2
E PB2 Data Terminal Ready 1* 2
F PB3 Ring Indicator 3
H PB4 Received Line Signal 2
J PB5 Unassigned (connected to pin 6 6529) 3
K PB6 Clear to Send 2
L PB7 Data Set Ready 2
M PA2 Transmitted Data 1 2
N GND Signal Ground 1 2 3
Mode 1 3-line interface
Mode 2 X-line interface
Mode 3 User defined interface



Note that the asterix symbol '*' refers to those lines which are held high during Mode 1 (3-line) opearion. I would also poiint out that Signal (or Logic) Ground is not the same as Chassis (or System) ground and it is advisable to keep them separated. The choice of mode is essentially determined by facilities you require. For instance, straight-forward one-way ASCII file transfer from a PLUS/4 to a C64 could be done on the simple 3-line mode. For more complex applications where a greater degree of control over the data flow was required, the X-line mode would be better, for example using a modem or interfacing to a non-Commodore machine. If you are uncertain as to which to use, start off with simplest first, it will either work first time or not at all.

I feel that I have now covered most of the aspects of RS232 on the PLUS/4 and now for something completely different as Monty Python would say (if you can remember that far back!). The PLUS/4 supports a disk drive DMA (direct memory access) interface which should mean very fast loading and saving cycles. I am still researching into this field and will publish my findings in CCI as soon as the work is completed. Commodore have released the 1551 disk drive in the UK which I believe uses this technique, however at the time of writing (January 1986) I have yet to lay my hands on one of these. Unconfirmed reports have it that there were only a few thousand of this drive ever manufactured which may account for the relative scarcity of this unit. It is certainly an interesting experiment since the new generation of Commodore 8-bit drives, viz. 1570,1571 and 1572 revert back to the serial bus technique and achieve operating speed enhancements by means of increased data transmission speeds, the so-called 'burst' mode. I feel that such a term is stretching credibility somewhat since with sub 2.0 MHz clock speeds on the processors of machine and drive 'canter' mode would be more accurate in the way of describing the DOS of the new drives.

The PLUS/4 is a very maligned machine and is much more a programmers computer than the C64. The features of its hardware have more in common with the C128 than with the C64 and although it may not have been a commercial success, this is more functional failure of marketing rather than engineering. If you want some ideas for experiments with the PLUS/4 then let's see someone come up an implementation of the disk DMA, alternatively what about using your PLUS/4 as a RAM disk device for your main machine, or even a printer buffer?

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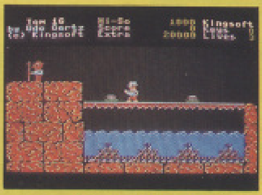
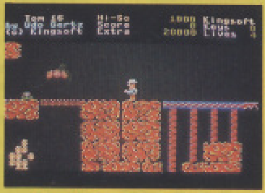

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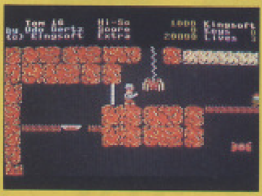
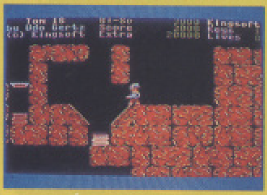

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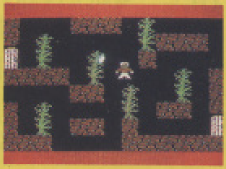
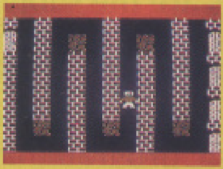
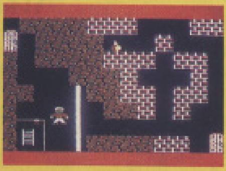
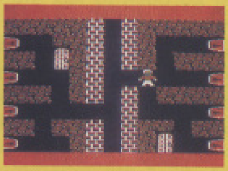

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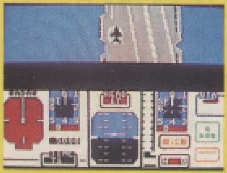

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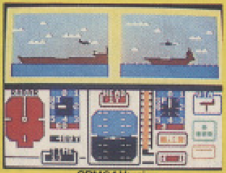

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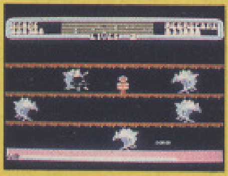

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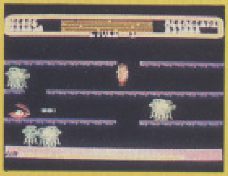

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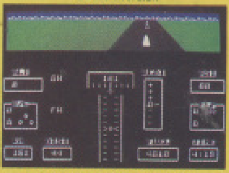

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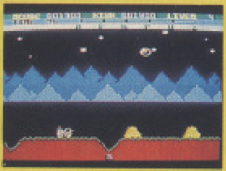

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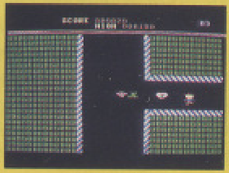

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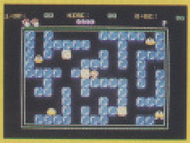

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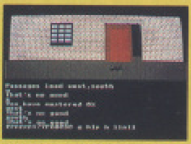

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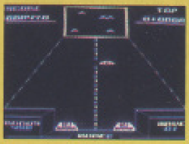

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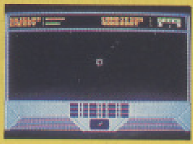

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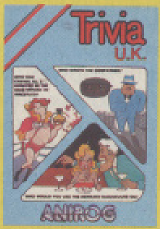

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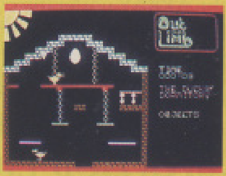

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BASIC for begginners

PART III

Arrays are the subject of the lesson to be learnt in Bill Donald's third installment in our guide to basic programming

You may have heard of or seen mentioned the word ARRAY. What is an ARRAY and what does it do? First, we must go back to last month's part of this series and briefly refresh our minds on variables. Variables are simply a means of allowing the user to define a quantity or value to a designated set of characters. In other words if you instructed the machine to regard the value of 1234 being equal to 'A' then everytime you used the variable 'A' the machine would take it that you mean the numeric value 1234. Similarly, you can also use words rather than numbers and manipulate these. All in all, variables are a convenient form of shorthand to us and easier for the machine to work with since the whole process takes up less memory.

For some applications it is convenient to use variables in the following form:-

A(1) A(2) A(3) A(4) A(5)
A(6) A(7) A(8) A(9) A(10)

Readers who are familiar with spreadsheets will recognise this layout. A spreadsheet allows you to place numbers or words into cells or individual blocks. These cells are arranged in a linear pattern across and down the screen and the cell contents can be moved to other cells or made to interact with other cells using the maths functions of the machine. If we use the above diagram as a simple model we could instruct the spreadsheet to add the contents of cell A(1) to cell A(5) and put the result in cell (A10).

Spreadsheets are the classic programming example of using subscripted variables, or variables which have a number-tag attached. I have shown below an actual spreadsheet for the benefit of readers who haven't seen one:-

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Olivetti M24	2,997	2,098	
APPLE Mackintosh	3,981	2,077	
APRICOT Zen	1,091	4,595	
COMPAQ Deskpro	2,594	2,988	
APRICOT Xi	1,022	1,341	
COMMODORE PC	1,490	1,983	
HP Vectra	498	1,003	
PHILIPS Yes	972	1,723	
ATARI 520ST	3	–	
COMMODORE Amiga	827	6,829	
CLONES	3,432	1,878	
Quarterly Totals			

The above is a simple spreadsheet and if you overlay it with the first table you will start to understand the principles behind ARRAYS. Before we leave the spreadsheet, here are some of the things that are possible even with this limited amount of data and largely depending on the facilities offered by the individual spreadsheet program: you could find out which machine's have the lowest and highest sales in the specified quarter, calculate the percent increase or decrease between different machines in terms of sales, or even project the future sales by drawing in more columns on the right hand side.

The spreadsheet was the application that lifted personal computers out of the hands of the select few and into the hands of the masses, perhaps now you could imagine the effect that this program had when it was first seen.

There are a number of ways to create and fill an ARRAY – you could do it the long way and enter the values individually or, alternatively, fill it by reading values into the ARRAY under the control of a loop. The latter is the more sensible method and the following program demonstrates this:-

```
10 PRINT CHR$(147)
20 SS$ = "SUBSCRIPTS"
30 GOSUB 150
40 FOR N = 1 TO 5
50 READ A(N)
60 NEXT
70 INPUT "SELECT A NUMBER, BETWEEN 1 AND 5";X
80 IF X>5 OR X<1 THEN PRINT "INCORRECT RANGE"
90 GOTO 70
100 PRINT "THIS NUMBER GIVES YOU YOUR WEIGHT IN KILOS";A(X)
110 GOTO 70
120 END
130 DATA 123.45, 6789.0, 9876.5, 432.10,44
140 END
150 LG = LEN(SS$)
160 SV = 20 – LG/2
170 PRINT TAB(LG)SS$
180 RETURN
```

Those readers who have the benefit of the TRON (trace on function) will be able to follow the program through, but for those who haven't this is how the program works. Start at line 70 which invites you to select a number between a fixed value (line 80 checks to see that you have done this and line 90 will send you back if you have made a selection outside the range). The number you picked is assigned the variable X and this is formed into the array at the end of line 100. The loop on lines 40, 50 and 60 determine that the number of packets of data in the array is five and reads in the value of these packets from the data on line 130. Lines 150 to 180 handle matters at the screen output and the program finishes on line 120. Note that it is not necessary for you to read the program like the machine which follows the instructions in sequence, you'll find that it is easier to break it down into modules. Also, you will have seen a new concept introduced, the READ DATA instruction. This is virtually self-explanatory and on this occasion we used a FOR NEXT loop to push the data into the array, machines with BASIC 3.5 or BASIC 7.0 could use the DO LOOP instruction.

An ARRAY can use a lot of memory space and the machine has to create and reserve these cells from being used up by other sections of your program. This is because although the cell could be empty during the initial stages of your program, it would be natural to assume that if you came across a whole section of memory filled with zero's then this memory is free for use, this is exactly what the machine would think too.

The Commodore BASIC Interpreter (the circuit inside the machine which controls the BASIC program) can accept you creating arrays without notification, provided the size of the array is less than 10 cells; anymore than this and the machine expects you to inform it and it will then start to reserve tracts of memory for these. These arrays are created at the top of the BASIC memory, in other words on the C64 the BASIC memory limit is situated at address 40959 (or hexadecimal value $9FFF), so your array on the C64 would start there and move DOWN in memory addresses. I mentioned that arrays are memory consuming so take note that the more arrays and strings that you create, the less memory you will have for your own program.

The technique of informing the BASIC Interpreter that you want to reserve memory for arrays is to use the DIM command which is shorthand for 'dimension', thus you instruct the machine to DIMension an array. It is obviously important that you notify the machine as soon as your program starts to run to protect memory areas, so it is the convention to issue these instructions in the first program lines. There is a limit on subscripted variables, otherwise you would end up with no memory if your arrays were too large and this limit on Commodore machines is 1000 per array.

For example, suppose that you wanted to catalogue your LP record collection and you have 25 titles to list, the syntax, or structure of the DIMension command would look like this:-

100 DIM LP$(25) or 100 DIM RECORDS$(25)

Be careful that you avoid the reserved variables applicable to your own machine (see your Users Manual if in doubt), otherwise you will get into a mess. Arrays may be DIMensioned together so assuming that you wanted to involve your cassettes and the cost, then the following would apply:-

100 DIM RECORDS$ (25), TAPES$(25), COST(25)

Note that COST is being defined as a numeric string, hence the absence of the dollar character variable. It is important that once you have created the arrays that you do not try to alter them afterwards during the course of a program. There are occasions when this is difficult, so work on the principle of making them too big to start with and then cutting them down after testing the program to see the minimum required. If you do try to re-arrange the arrays after creation, the error message 'REDIM'D ARRAY' will appear on the screen.

The memory of your machine after running with a number of arrays tends to take on the appearance of a lump of Swiss cheese. By this I mean that large sections of memory are in use interspersed with dead areas which are for the most locked up. You can reclaim this memory back by issueing the command FRE(0), either in direct mode or program mode. The action of reclaiming memory is called 'garbage collection' and the effects of this can be quite dramatic. It really depends on just how much garbage there is to be cleaned up but it can mean the machine locking up for several minutes in severe conditions. In fact the C64 and VIC-20 were notably weak in this respect, whereas the newer machines such as the C128, PLUS/4 and C16 can operate their garbage collection quite quickly. Deciding when to invoke garbage collection under program control can be tricky, the best opportunity could be when the user has to spend some time reading a screen display of text or graphics.

If you go back to the first diagram you will notice that it has the structure of 'row' and 'columns', the columns being the lines running down the page, whilst the rows being those going across the page. Spreadsheets use this as part of their terminology although in mathematical terms it is known as a matrix. The arrays or matrices that we have looked at have been purely two-dimensional, in other words across and down, there is another type, the three-dimensional array. This concept can be a little difficult to grasp at first so we'll go straight into the syntax and then look at this afterwards.

100 DIM RECORDS$ (50,2) a two dimensional array

200 DIM TAPES$ (50,2,4) a three-dimensional array

Thus our two-dimensional array for RECORDS has a structure of 50 rows and 2 columns whilst the three-dimensional array for TAPES has the same 50 rows and 2 columns with an additional 'page depth' of 4. Just in case your application is memory conscious the following figures apply to arrays:-

1. Array Name	5 bytes
2. Individual Dimension	2 bytes
3. Integer Variable Element	2 bytes
4. Numeric Variable Element	5 bytes
5. String Variable Element	3 bytes
6. Character in a String	1 byte

Multi-dimensional arrays find extensive use in the more exotic branches of maths, whereas you and I tend to bump into them in Adventure Games. In programming terms, an Adventure Game could be regarded as on huge multi-dimensional array, hence the reason why two games are never quite the same because of the element of random selection within these arrays.

If we return to our number program you will notice two new program techniques to the series, the READ-DATA statement and for the FOR-NEXT loop. The READ-DATA statement is self-explanatory, you have diverted the program to find an element of data, collect it and use it by inserting this data into the specified part of your program. The data can be literally anything, numbers, characters, there is no restriction on the length of data and you can even mix it by having characters and numbers together. In computer jargon you have created a 'data table' and provided you exercise strict control over the fetch and execute instructions then your program shouldn't get into a mess. A common failure of beginners to BASIC using the READ-DATA command is forgetting to put the RESTORE instruction into the program when you need the machine to read through the data table again. Note that you cannot jump straight into the table at random, the entry point is fixed at the beginning.

FOR-NEXT commands are a device to create loops for either timing or counting a condition within your program. Your computer has an internal master clock which is named the system clock and the whole structure of digital computers such as yours depends upon extremely accurate timing. The source of this timing is derived from the mains frequency being compared to crystal circuit, any significant variation in this mains frequency can have a detrimental effect on the running of the computer. This is why machines destined for the North American market which has a mains frequency of 60Hz are different for UK machines running on 50Hz. It is largely a matter of the designed tolerance to fluctuations in the mains frequency, but running 60Hz electronic equipment on 50Hz may not be a good thing.

So FOR-NEXT loops use the internal clock to regulate them in terms of time, but the user can set the limit as to the number of counts that the loop performs. Loops are very common in computer programming and they serve a multiplicity of purposes. The most common use is to count and the syntax of a FOR-NEXT loop is quite easy to learn:-

10 FOR A = 1 TO 100 (FOR variable = start TO finish)

20 NEXT A (count and then return)

In the next part of this series I'll be going further into program loops and counters and exploring the more powerful version of the FOR-NEXT command, the DO-LOOP-ELSE. You can do some pretty impressive programming just using a few lines of code with loops. Remember to keep up your practicing until next month.

Mega-Review

DODGY

DRAGON SKULLE

DRAGONSKULLE.

After brief journeys to IMHOTEP, and having been besieged by OUTLAWS, Ultimate have returned to their senses and released DragonSkulle – the fifth in the series of Sir Arthur Pendragon games.

In Dragonskulle you must lead Arthur on his quest to defeat the 'Ultimate forces of darkness and Chaos'. In true Ultimate fashion you must lead a chunky Sir Arthur around various rooms and caverns, collecting items that will further aid your adventure.

Although amazingly similar to the previous Pendragon games, Dragonskulle still has a certain attraction, as you work out how to get the shovel, and where to find the magical energy cloak.

Whether the inclusion of the 'trendy' icons is an advantage will depend on how you play the game, but for me they were more of a hindrance than a help.

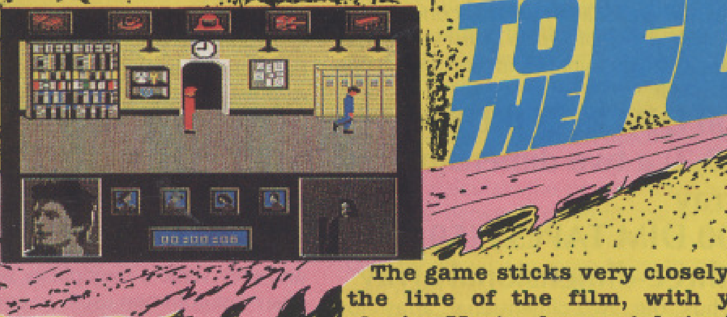
The sound effects of Dragon skulle are almost all taken directly from the previous games, although the tune sounds a little different!

Overall, I thought I would be really glad to see the return of this type of game from Ultimate, and indeed it is an awful lot better that their tow non-Pendragon games, but unless you are a die-hard Arcventure player – there are many better games about!

Price: £9.99
Graphics: ***
Sound: **
Playability: **
CCI Rating: DODGY
Contact: US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel:021-359 3020.

IFFY

BACK TO THE FUTURE



BACK TO THE FUTURE

Well, well, well. Having given you a preview last month, and said that the game looked as if it could have some promise, the finished version arrived on my desk. After reading the lengthy instructions, I loaded the game and prepared to be astounded.

Unfortunately I wasn't. Activision – of which Electric Dreams are a subsidiary – have released some really good titles recently, but Back to the Future will not go down as their best.

The game sticks very closely to the line of the film, with you playing Marty, desperately trying to instigate a kiss between your mother, Lorraine and your father, George. If you actually manage this you will achieve your desired result and get BACK TO THE FUTURE.

Graphically, BTTF has some good points and some bad points. The scrolling is very smooth, and the digitised pictures of Marty and the Family are well represented, but the definition of the actual characters leaves a little to the imagination.

The sound was also quite good, with a version of the Power of Love – Huey Lewis', not that dreadful Jennifer Rush thing – and a foot tapping version of Johnny Be Good.

Overall, BTTF is a good, if not excellent program. Its only real problem is that it looks as if it has been rushed a little. Obviously they did not want to release it too long after the film's initial impact, but a little more time could have led to an excellent game!

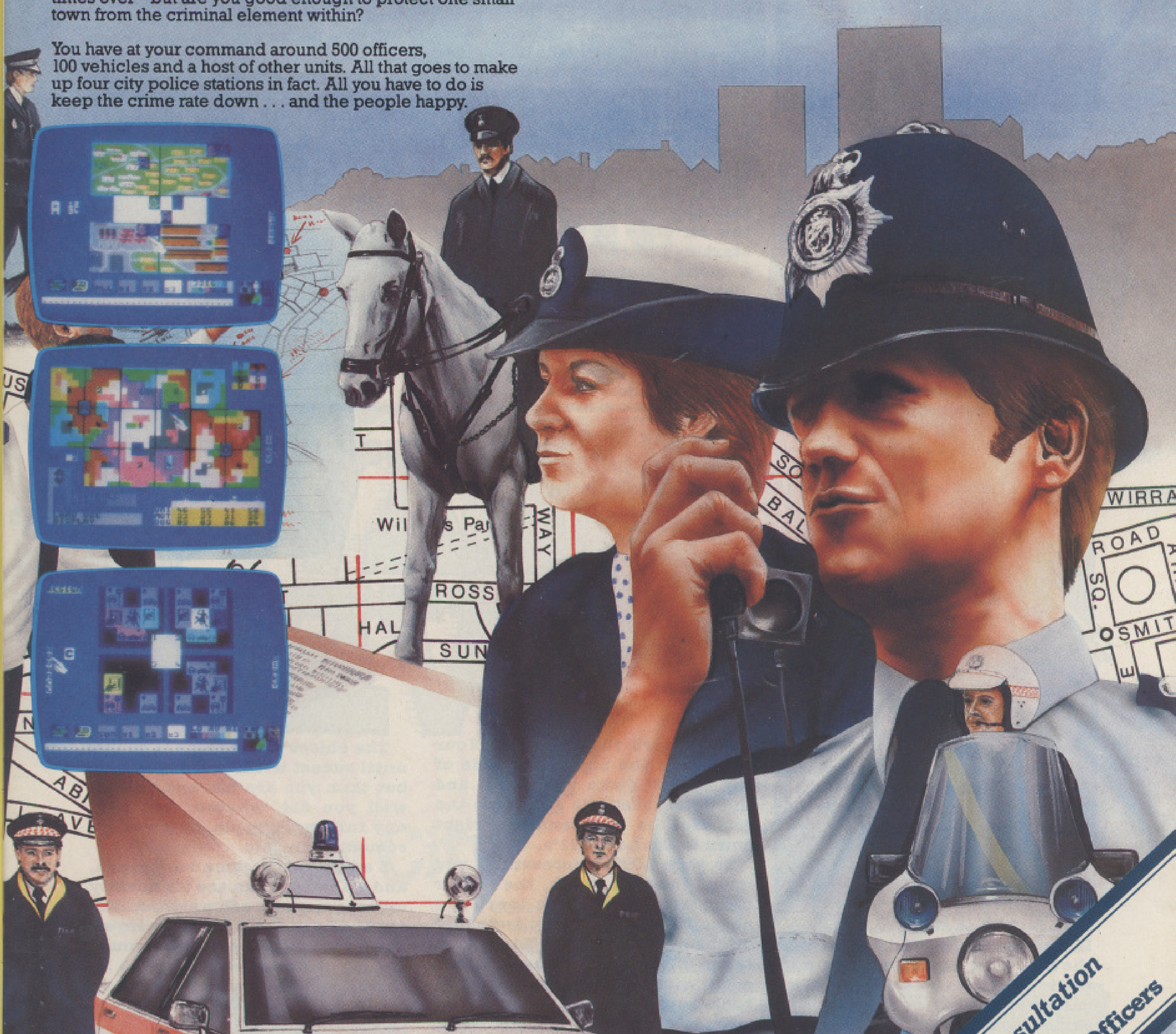
Price: £9.95
Graphics: ***
Sound: ***
Playability: ***
CCI Rating: IFFY
Contact: Electric Dreams, 31 Carlton Crescent, Southampton, Hampshire SO1 2EW. Tel:0703 229694.

THE FORCE

An icon-driven multi-screen strategic simulation of what it's like to take on the most difficult task of all

You may have saved the world from invading aliens many times over – but are you good enough to protect one small town from the criminal element within?

You have at your command around 500 officers, 100 vehicles and a host of other units. All that goes to make up four city police stations in fact. All you have to do is keep the crime rate down . . . and the people happy.



Designed in consultation with Britain's Senior Police Officers

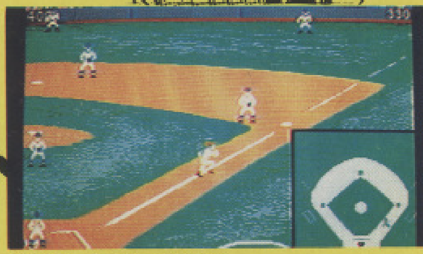
MIND GAMES

Available for the Spectrum 48K and CBM64

Argus Press Software Ltd., Liberty House,
222 Regent Street, London W1R 7DB
Telephone: 01-439 0666

Argus Press Software Group

AWESOME



HARDBALL

When US Gold announced a licensing deal with Accolade, a new American company formed when some co-founders of Activision left to start a new company, I was extremely excited. I had heard a lot of really good things about the graphics and sound of the games produced by this company.

The first game I received was Hardball, an amazingly realistic baseball simulation – with truly American touches! If you've never played Baseball before, then reading the instructions will prove essential, otherwise I found playing the game was the easiest way of learning.

To make the game more entertaining, Accolade have given various options of play, for one player vs a computer team, and for two players. However what makes the game so special is the outstanding graphics and attention to detail.

The contest is played over 10 innings, with you playing either the All Stars or the Champs. On starting the game, you are shown a close-up of the 'Pitcher', the 'Catcher', the 'Batter' and the 'Umpire'. If you are pitching you must choose what type of pitch you want to throw. Dependant on which pitcher you are playing you have a choice of Fastballs, Curveballs, Sinkers, Screwballs and Offspeeds. Using these you must fool the batter into missing the pitch three times and thus striking out!

Animation of the large characters is superb, as is the map of the whole out-field, and I must admit that it the first sport simulation 'I have played which has taught me anything about sport.

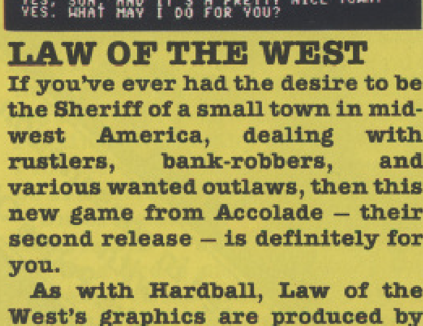
Even the batter has a wide variety of options on what to do. Dependant on what the pitcher attempts to do you can decide how to hit the ball, or whether to 'Bunt' for the team.

If this doesn't go down as one of the best games of 1986, I will be most surprised, for it will take one hell of a sports game to beat this one!

Price: £9.95 Cassette.
£14.95 disk.
Graphics: *****
Sound: ***
Playability: ****
CCI Rating: AWESOME!
Contact: US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel:021-359 3020.

CRISP

LAW OF THE WEST



```
YOU THE MARSHALL OF THIS TWO-BIT TOWN?

WHAT'S IT TO YOU, PUNK?
YOU GOT A BURR UNDER YOUR SADDLE, BOY?
YES, SON, AND IT'S A PRETTY NICE TOWN.
YES. WHAT MAY I DO FOR YOU?
```

LAW OF THE WEST

If you've ever had the desire to be the Sheriff of a small town in mid-west America, dealing with rustlers, bank-robbers, and various wanted outlaws, then this new game from Accolade – their second release – is definitely for you.

As with Hardball, Law of the West's graphics are produced by an artist called Mimi Doggett, and truly superb they are too. Your veiw is of the right hand side of the sheriff (who you play), and the detail that has gone into the graphics is outstanding, right down to the Levi 501's.

To play LOTW successfully you must interact with the other characters – of which there are about 10 – gleaning any facts that might prove of value. The action takes place in various settings each with a different graphical backdrop.

Each character has different characteristics, and depending on how you respond to their conversation – you have a choice of responses along the bottom of the screen – they will react differently.

The object of the game is to last until sunset without being killed, but then you are marked on how well you did, whether you shot any innocent people, how you did romantically, etc.

I enjoyed the game very much, and although I can see its novelty value wearing off a little, the sense of power as you draw on an innocent bystander is enormous!

Price: TBA
Graphics: ****
Sound: ***
Playability: ***
CCI Rating: CRISP
Contact: US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel:021-359 3020

CRISP

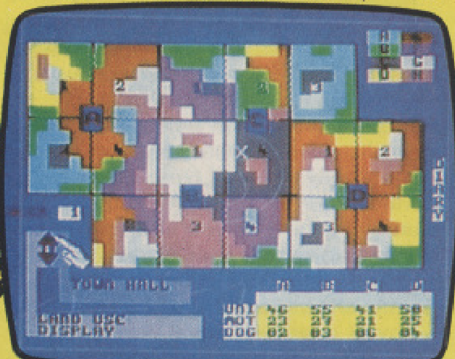
THE FORCE

Have you ever wondered what it would be like to run an areas police force, controlling who goes where, or how many men are assigned to a VIP's arrival? If you haven't it's not very surprising as it's hardly an everyday, Jim'll Fixit, type dream!

Mind Games, a sub-label of Argus Press Software, in conjunction with Scotland Yard – have given me a sneak preview of this, their latest game. If you are a diehard simulation player, then this one is for you!

To succeed at this game, you must assign your men (and women, and dogs!) to cover each area, making sure there are enough both to prevent crime, and cope with special occasions.

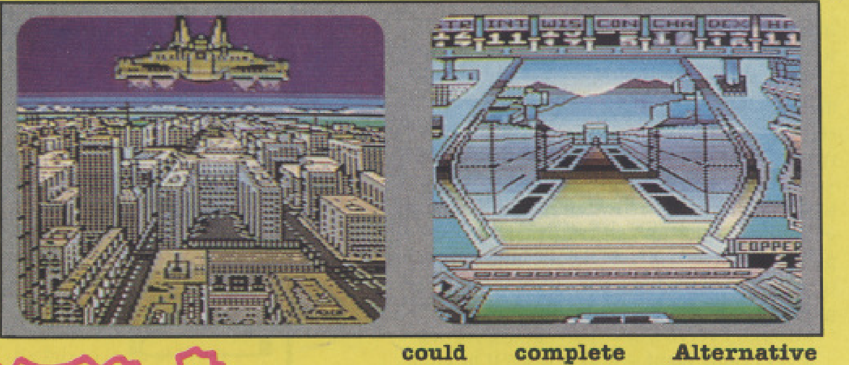
There are plenty of different areas to cope with; Airport, Town Hall, Industrial Estate #1, and many others. Overall, what I've seen of the game is enough to say that although it cannot be described as an all action game, it certainly will have the more patient of you glued for hours!



THE FORCE

Price: TBA
Graphics: ***
Sound: **
Playability: ***
CCI Rating: CRISP (for strategists)
Contact: Mind games, Liberty House, 222 Regent Street, London W1. Tel: 01-439 0666.

IFFY



alternate REALITY The City

I could make some really profound Freudian statement about the title of this game. Talking about the semi-concious state in which the mind – having detached itself from the body – can develop a new inner depth which would effect the complete persona, but as that has nothing to do with the game, I won't bother!

Released by Datasoft in America, and imported recently by US Gold, it attempts to combine many different types of game to create an experience which combines them all.

The game itself is a combination of discovery/strategy, in that having landed in 'The City' you must travel around, making money, buying essential items, and generally avoiding attack from the more criminal elements of society. If you manage to achieve all this, and avoid getting pis*#d (Drunk! Ed.) too often, you could complete Alternative Reality – and if you do, please let me know!

Graphically AR shows a maze like quasi 3D view of the city, and as you move around you see different labelled doors which lead to various shops, pubs, banks etc. In these you also sometimes get music which although it sounds as if it's being played underwater, can be quite decent.

Overall, an above average game, but not one I would recommend to the avid arcadite amongst you.

Graphics: ***
Sound: ***
Playability: ***
CCI Rating: IFFY
Contact: US Gold, Parkway Industrial Estate, Heneage Street, Birmingham. Tel: 021-359 3020.

THE AMIGA HANDBOOK
by David Lawrence & Mark England – £7.95

The Amiga is supposed to be a user-friendly computer aimed at the general public and in particular the businessman. We asked Harry Sylvester, a London businessman with experience in PC's and office systems, to take a view on the first AMIGA book published in the UK. Here is his verdict.

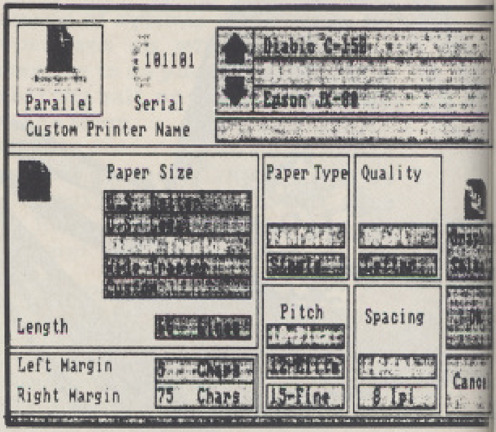
When I was asked to read 'The AMIGA HANDBOOK', I was not overjoyed. Books about computers too often are written in what one might call 'Technical Manual Pidgin'. This is a style which assumes a) you already understand not just the terms used but also the theory that lies behind them and b) that writing about computers has no need of rhythm or style and that what the reader really wants is a technical catalogue padded out to book length.

I am not a computer expert, so I do want both the terminology and the theory explained. I am also, I hope, a reasonably civilised person who prefers to read with enjoyment even when I am trying to learn something new. The first thing I must say about this book is that it does both of those things admirably. It starts right at the beginning explaining the simplest aspects of the AMIGA and even some useful ideas about computers as a whole and works through everything anyone at a reasonable level could want – and it does it in clear, pleasant-to-read language. It gives that excellent feeling of good communication, as if the authors were sitting talking to you, even anticipating questions you are not informed enough to ask.

The AMIGA is being presented by Commodore and the press in general as a wonder machine that can do what virtually no other machine can, in fact, setting new standards. It is supposed to be able to fulfil the needs of the businessman and the higher level of home user. However, in the paen of praise, we have not been told, at least it has not got through to me, what makes the Amazing Amiga such a wonder machine. Oh yes, I've heard about the special chips; Agnus, Denise and Paula; about the MC 68000 Motorola chip; about the workbench and the Intuition operating system and the Blitter and the Copper co-processor; and the bouncing ball of course.

But all the columns of coverage the AMIGA has had have not explained comprehensively to me, an ordinary modern businessman and potential AMIGA user, how these miracles of computer development actually work. This AMIGA Handbook however, does just that. It covers the general ground on how each of these clearly extraordinary aspects actually function, what part they play in the genuinely amazing capability of the AMIGA and how they, frequently simultaneously, work together. Most importantly this is all presented in such a way that even someone who is totally unfamiliar with the practical realities and limits of using a computer and the theoretical basis for computer science can easily understand. I now believe I know why its custom-designed chips allow the AMIGA to outpace machines many times its price. I realise how the built-in libraries control its graphics, sound animation and speech. I'm familiar with the 'Intuition' user interface for its windows and icons; and the delightful easy-to-use workbench; all that and much more about the AMIGA is suddenly crystal clear.

The visual element of this Handbook is simply taken straight from the AMIGA. What you see is what you will be presented with on the AMIGA screen and there are 31 pages of reproductions and explanations, once again all extremely clear and understandable.



Left Margin 5 Chars

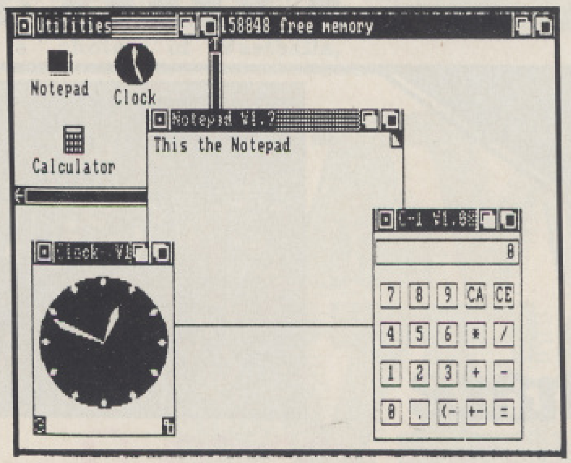
Right Margin 75 Chars

12-Elite

15-Fine

8 lpi

The printer options screen



This the Notepad

Some of the free utilities on the Workbench desk

There are some people who, I know, will not want this book. There is already a small group of 'AMIGA experts' among the general public. They are the lucky or professionally involved people who have or have had access to an AMIGA and firsthand experience of its miraculous talents. This book is not for them. One such to whom I showed it, glanced at it and sneered that it was not advanced enough for him. He may be right, but I think he could be wrong. It seems to me extremely thorough. It is in any case well-designed to carry out the task the authors have set themselves: to give the very large number of potential buyers of the AMIGA a real guide to its capabilities and a chance to decide, without spending the £1500 or so an AMIGA costs, whether its unchallengably excellent potential is one they can or want to use.

If this book is criticised for being unoriginal and insufficiently technically profound, I believe the authors could justly point out that it is the AMIGA that is original and that its technology may require deeper investigation by computer professionals who are developing software but that audience is not the one for whom this book has been written.

For a potential, and now, after reading it, much more likely purchaser of an AMIGA, it will serve as a very useful introduction to an outstanding computer.

Contact: Pitman Publishing, 125 Long Acre, London WC2. Tel: 01-379 7383

This month your letters are answered by Rae West. Rae is the author of three large reference books on Commodore computers; the latest is Programming the Commodore 64, following Programming the VIC and Programming the PET/CBM. All are published in the UK by Level Ltd. Rae is also published in the USA by Compute! Books.

Dear Rae,
I'd very much like to know if any Turbo loading tape systems are available to the public.

S. Squires, London.

Certainly Novaload is available on a licence basis. It's likely that others are available too.

Contact Novagen Software on 021-744-1624.

Dear Rae,
When I load a 64 program off disk, say from 2048 to 8192, the memory just below 40960 is changed to the name of the program I just loaded. If a program is already there, it will be corrupted. Can the name be positioned elsewhere?

A.A. James, Burton-on-Trent.

*What you've noticed is a consequence of the way the 64 stores strings of information; all strings – including things like program names – go into the top of memory. What you need to do is lower the top of memory, and this is quite simple: POKE 55 and 56 with the low and high values of the new BASIC top (eg POKE 55,0: POKE 56,120: CLR lowers it by 40*256 = 10K bytes). Use CLR to make all the pointers consistent. Try PRINT FRE (0) to see how much the free memory has shrunk.*

To understand these points completely, read chapter 5 ('Advanced BASIC') of my book.

Dear Rae,
Am I correct in assuming that the Comal 80 cartridge in the Plus/4 port would look like this?

```
LDX #$05
LDX #$00
STA ($FDD0),X
```

What I'm trying to ask is how does one get the Plus/4 to act as a C64 game ROM? As simple as possible, please.

A.L. Hughes, London E8.

I'm afraid you've not been told much about your Plus/4. (i) The Plus/4 is designed in a different way from the 64, and won't run any of its software apart from simple BASIC programs. (ii) The 64's COMAL cartridge won't fit the Plus/4's cartridge port – they are deliberately different in size. (iii) COMAL is a language rather like BASIC; the example you've written is not COMAL at all, and would only give syntax error messages with COMAL. Your example is a version of machine language (and an includes error).

To summarise, you can't get a Plus/4 to run C64 games.

Dear Rae,
Could you tell me if there is any way of saving to tape a graphics screen which I've created in direct mode. I need to save locations from 1024 to 2023, and color locations from 55296 to 56295.

I also wish to create a graphics screen using a utility program, and save this to tape to send to my friends who have C64s, to LOAD and RUN.

I'm having the same sort of problem with commercial music utilities – I cannot incorporate my masterpieces into my own programs!

J. Gimblett, West Drayton.

The first part of your question is relatively easy to answer: low-resolution screens of the sort you describe can be saved in program format, which is the most efficient way of storing them, by altering BASIC's start and end so that the system saves the part of memory you want. POKE 43,0: POKE 44,4: POKE 45,232: POKE 46,7:SAVE "SCREEN", 1,1 and POKE 43,0 : POKE 44,216: POKE 45,232: POKE 46,219: SAVE "COLOUR", 1,1 will do the trick. Having saved these, you only need to LOAD " ", 1,1 twice to force the data back into the same areas of memory, restoring the picture. (My book 'Programming the Commodore 64' has a detailed section on block saving, including the tricky case of saving from within a program).

If you are using your own custom characters, things get more complex – you also have to save, or poke in, the bytes defining your characters, and also set the VIC-II chip to look at them.

Bit-mapped screens can be saved and restored in just the same way, but things are more complex: (i) they occupy much more memory, (ii) they can be put into many different areas of memory, because the VIC-II chip is wired up to ensure considerable versatility. The key locations here are (i) 56576, controlling the VIC-II's bank; (ii) 53272, which controls both the start of screen memory and the start of character memory; (iii) 648, which makes BASIC work properly with the new memory arrangement. With a utility program, you'll have to determine the values in these locations to work out which parts of memory to save. P. 384 of my book explains all this.

Music utilities are more difficult: the bytes holding the musical notes, and the way these are processed, are different for each system, so a lot of detective work is usually needed to use them in one's own programs. If they're written in machine language, deciphering them will be very difficult: you could contact the publishers or author(s) for information. As you say, this does detract from the value of otherwise excellent utilities.

Dear Rae,
I've been trying to combine the video output from my 64 with the video signal from my VCR. I can record either signal separately, but I'm told I need some sort of synchroniser to bring the two together. Is there any way I can make the 64 sychronise the two signals? The object of all this is to produce title rolls for video tapes of weddings etc.

M. Don, Whitby.

I suggest you contact 'Master Class' Cheshire, on 061-436-4780. These people produce videos relating to the 64 and have experience in the sort of interfacing problems you've experienced.

Dear Rae,
When altering machine-code routines it is essential to know the start and end addresses of the program in memory. It is possible to access this information from a short BASIC program?

J. Andrews, Peterborough.

You don't say whether you're using tape or disk.

With tape, just use OPEN 1, which will read the header of the program. This has the start and the end address – PEEK from 829 to 832 to get these values.

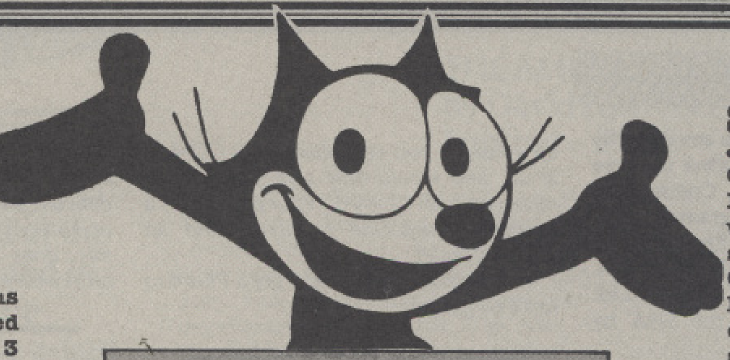
Disk programs have the start address but not the end address; a program simply loads until it gets to the end. The following program prints the starting address, and also determines the end address by reading the program:

```
  10 OPEN 1,3,"0:'NAME, P,R"
  20 GET #1, X$,Y$: PRINT "START IS";
  30 S = ASC (X$+CHR£(0))+ 256*
ASC(Y$+CHR$(0))
  40 PRINT S
  50 GET #1, X$:S=S+1: IF ST=0 GO
TO 50
  60 CLOSE 1: PRINT "END IS" S
```

Do you have a computing problem, or advice to offer other readers? Write to us at:

Queries,
Commodore Computing International,
Finsbury Business Centre,
40 Bowling Green Lane,
London EC1R 0NE

Please do not send your SAE's as it is impossible to reply personally to every query.



Felix Says...

Hi folks!! I'm back again this month, and with even more exciting bits and pieces that seem to have been flying around!

Ho-Fung ji!

In last months mutterings I mentioned the quietness of System 3 recently. Well, in response Mark Kale phoned me. He then invited me round to his new offices, and showed me some of the stuff they've been doing. First off was International Karate on the 64. WOWEEE! It looks absolutely brilliant. Yes it's better than fist (or what I've seen is). Programmed by Archer MacLean, with music by Rob Hubbard, I'd recommend it to every 64 owner. More next month.

Far Our Man!

Well man, I've just got in from a really wierd experience. That guru of hippies, J. Minter, had a little do the other night to launch his new Colourspace on the Atari 520st – I know it's not strictly Commodore but maybe he'll do it for the Amiga. Anyway, man was it cool! Held at the Laserium he did a 40 minute show to music such as Marillion, then there was this far out laser show to Genesis. Finally there was a duet of Lasers and Colourspace to Stairway to Heaven!

Wow man it was really free!

At Last... Response!

Last month's little morcelettes seem to have created more than a little reaction from interested parties. A certain person phoned up to say that he had loads of new products, and "did we have a spare page for them?". I'm going to see these games very shortly so I'll let you know all about any relevant developments next month.

Ok, so it's here!

After last month's announcement that I had waited for rather a long time to get hold of the Young Ones game from Orpheus, it promptly arrived. I also got a phone call assuring me it had been on sale for quite a while, ummm! Having played the game I can now proudly say I still can't understand it, but by next month I'll have worked it out (or died trying!).

Stop Press!!

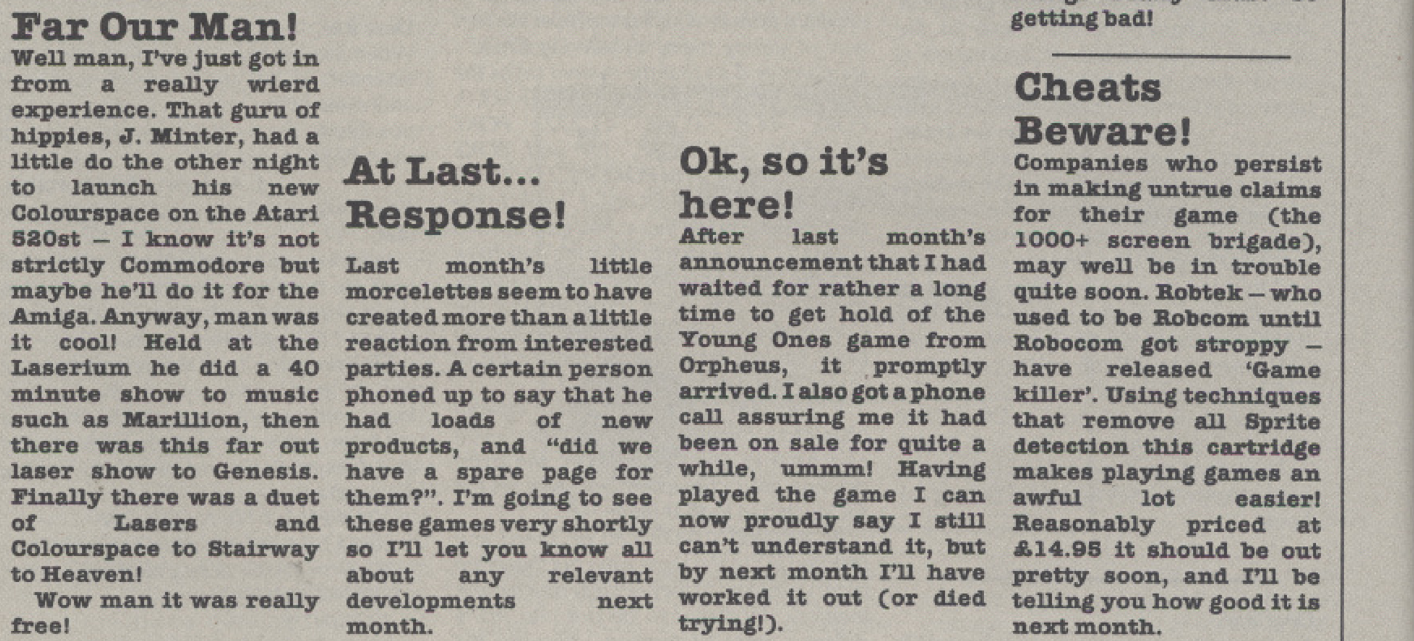
Just a brief note tell you Comic Bakery from Imagine has arrived, with another excellent soundtrack by Martin Galway. The game however is just a fraction easy; 123,000 on my second ever game!!! More next month!!

Hot Shots?????

Wars between rival rags don't interest me greatly, but when one gossip column is so short of material that it has to revert to copying their material from the Ludlow mafia then claiming it as theirs, things really must be getting bad!

Cheats Beware!

Companies who persist in making untrue claims for their game (the 1000+ screen brigade), may well be in trouble quite soon. Robtek – who used to be Robcom until Robocom got stroppy – have released 'Game killer'. Using techniques that remove all Sprite detection this cartridge makes playing games an awful lot easier! Reasonably priced at £14.95 it should be out pretty soon, and I'll be telling you how good it is next month.


The Commodire Kid
by Max
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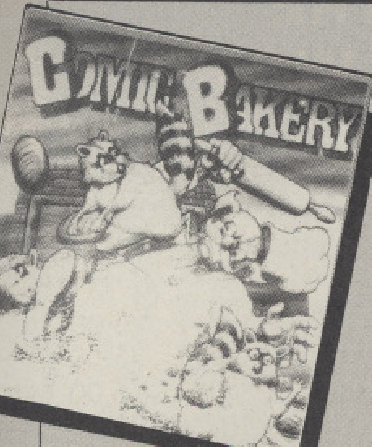
JUST RIGHT! THIS MOUSE IS GREAT!
MOUSE!?



Sorry Everyone

No no no, I'm not apologising (fools!): Domark have withdrawn their tasteless cover of Friday 13th due to the fact that almost everyone told them how dreadful it was. Unfortunately they didn't realise that everyone was really refering to the game. Well, they do try, and I'm assured by a certain PR man that their new game on the 64 really should be good. I am waiting, eagerly, to see it!

Ho Hum..

Having got really quite excited about seeing Ocean's American Football program, which was promised to the world in time for the Superbowl, I now see that it has been delayed. Although this is not rare for Ocean's product, I do hope for their sake that they haven't missed a real chance!

Onward Forever

Continuing their policy of getting anything that moves, and some that doesn't, US Gold have signed a marketing agreement with English Software. The first title to be affected by this agreement will be Elecktraglide on the 64. Knight games, their next release will also be incorporated in the agreement.

I had better keep this space open each month for US Gold's new aquisitions. What I said about Cuba was wrong, but the Philippines...who knows?

Tweet Tweet!!??!!

If you look at a certain Commodore rag this month you may notice the tremendous emphasis, including the cover, given to a certain new game, singing its praises.

A little bird has told us that people are asking whether it could be a coincidence, or that the Editor of said rag could be related to someone high up at the software house.

Shome mishtake shurley? (And stop calling me Shirley!) Cont page 94.

Turbo Esprit

Speculation (ho ho!) created by a certain Commodore magazines inside front cover about Durell's Speccy and Amstrad game Turbo Esprit seems to have caused a little embarrasment. I wouldn't try and buy it if I were you!

It turns out that the advert was meant to be for Durell's excellent 64 game Critical Mass. I'm sure someone got a smacked wrist for that one!

Ha! ha! ha!

Witty press release of the month award goes to a small comment at the bottom of Martech's announcement of Zoids – The Battle Begins. Having told us the game will be out soon and will cost £8.95, this follows:

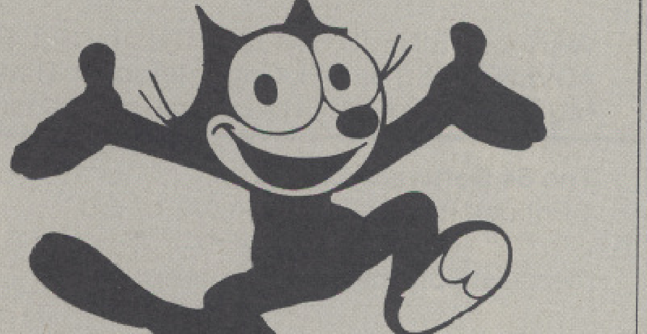
"Zoids will do to the competition what the Chicago Bears did to the New England Patriots", and in case you weren't up at 2.15 am they totally slaughtered them, but I hope for David Martin's sake that the opposition don't buy a 'Refrigerator'!!!

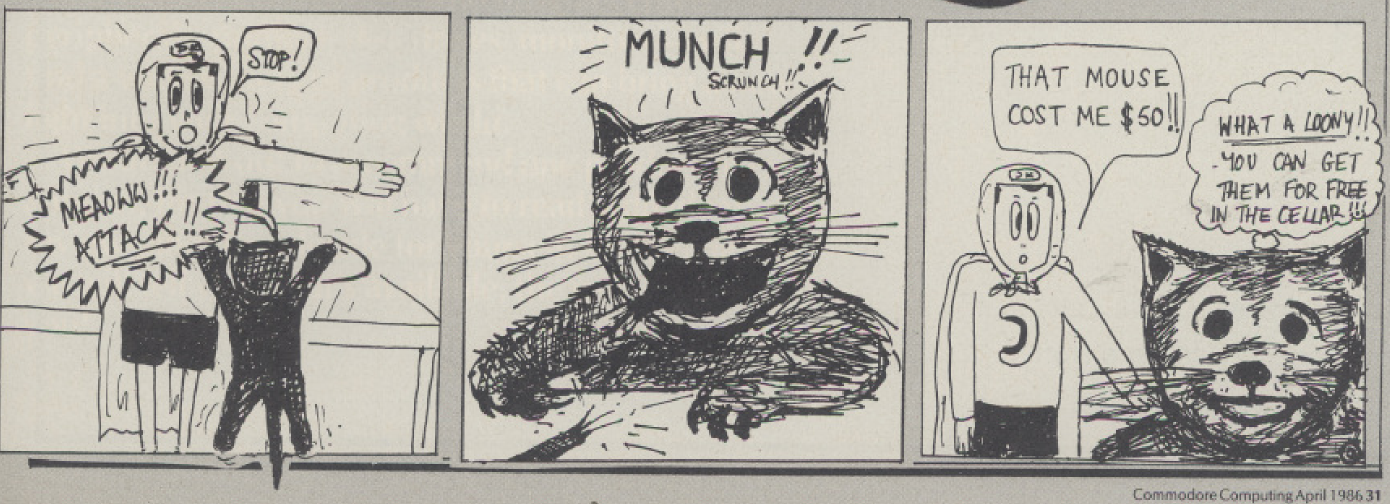
More From Sweden

Greve Graphics, who I introduced you to last month, sent me a screen shot of their game 'Soldier one'. As it is only a loading shot I can't tell you much – if they ever gave me their phone number I'd ask them for a copy of the game. Until then, watch this space!

OK enough for this month except to show you a little picture drawn of me by a friend. I know I'm a handsome devil, but my owner certainly leaves a little to be desired!

Bye from the world's most famous cat, FELIX.




STOP!
MEAOWW!!! ATTACK!!
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	– CSM:	1541 disk drive alignment program	d	49.95
	– Supersoft:	1541 Flash kit	d	89.95
		Blitz Basic Compiler	d	49.95
		Mikro Assembler	r	57.50
		Victree	r	56.35
	– Broderbund:	The Printshop	d	44.95
		The Printshop Graphics Library [1,2 or 3]	d	29.95

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ADD-ON ISSUE

ADD-ON POWER

16 PAGE GUIDE

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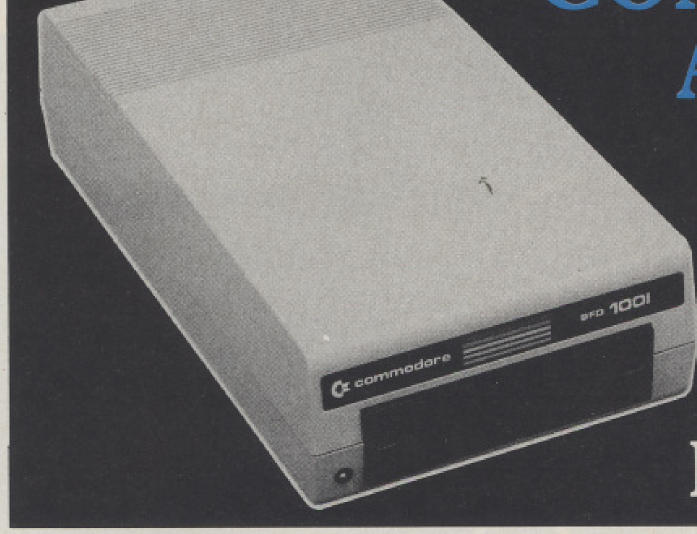
Without peripherals, a computer is really a solution looking for a problem. Unfortunately choosing which product will be most suitable for your application is not so easy. Will it be compatible? Does it provide the options you need? Are there any alternatives? Only when you have checked up on all the products can you really tell which one will suit you.

With this comprehensive peripherals guide, CCI intend to show you what's available for your Commodore. Even people who have accepted peripherals, printers, disk drives, monitors – will find a wide variety of products that can bring a new light into your computing world.

We are not out to recommend one product over another, for that you will have to read individual reviews and then decide for yourself. In this guide we will tell you what's available, the rest is up to you!



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Product	Features	Price	Company
BM 7502	P31 Phosphor, green screen 12" Mono	£87.95	Philips
BM 7522	LA Phosphor, amber screen 12" Mono	£91.95	Philips
BM 7542	WD Phosphor, Paper white screen, 12" Mono	£91.95	Philips
BM 7513	P39 Phosphor, green screen 12"	£119.95	Philips
CM 8500	Std. resolution, grey glass screen 14" colour, composite video	£222.95	Philips
CM 8501	Std. resolution, grey glass screen RGB 14" colour	£243.95	Philips
CM 8524	Std. resolution, dark glass etched screen, composite video + RGB 14" colour	£279.95	Philips
CM 8533	Med. resolution, dark glass etched screen, composite video + RGB 14" colour Compatible with 64, +4, 16, 128, PC	£314.95	Philips
CM 14	14" monitor, RGB, Scart, composite video. Colour.	£199.99	Fidelity
KX 14 CP1	14" monitor, new and specially designed unit for use with personal computers. High resolution, video input connector enables it to be used with VTR or TV tuners and direct broadcast satellite.	£462.50	Sony
1701	14" colour monitor gives the sharpest picture with the most vivid colours possible from any Commodore home computer. It has two inputs. The composite video input at the front will accept a signal from the VIC 20 or a suitable video recorder. The second input accepts chrominance and luminance signals output from the 16, 14 and +4. Comes complete with 8 pin connecting lead.	£230.00	Commodore
1431 AP	14", standard resolution, low complexity colour display, high quality resolution	£259	Microvitec
2030 AP	20", standard or high resolution	£465	Microvitec
CM 31481 VI	80-column text display, green or amber text switch	£270	Thomson
VM 3102 VG	Flat-face monitor with green text (amber text-VM 3102 VA)	£85	Thomson
CM 36632 V	40-column text display, built in speaker	£189	Thomson

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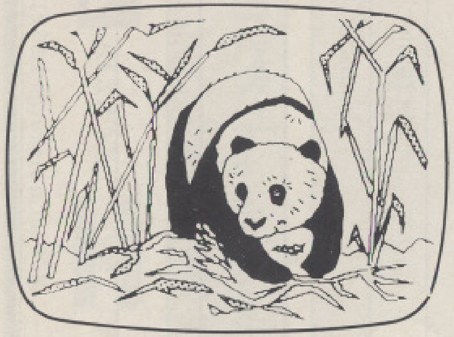

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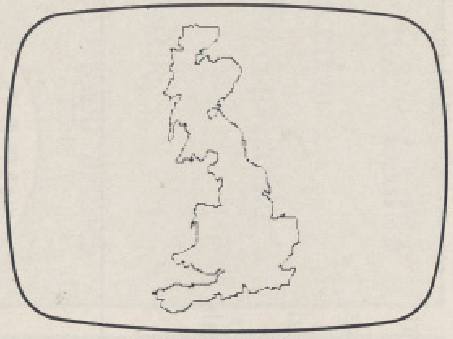

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ADD-ON GUIDE

PRINTERS/PLOTTERS

Product	Features	Machine	Price	Company
MT-85	7 × 9 dot matrix. Max print speed 180 cps. NLQ mode 45 cps. Max paper width 10″. Fully IBM and Epson compatible.	64, VIC 20 (needs 'black box')	£369.95	Mannesman Tally
MT-86	As above. Max paper width 15″.	64, VIC 20 (needs 'black box')	£469.00	Mannesman Tally
1510 Printer/Plotter	Uses a continuous roll of paper and can plot, draw and write in four colours. Ideal for program listings, graphs, pie charts, creating designs and drawing pictures. Max paper width 4½″. Print speed 14 cps.	64, VIC 20, 16, +4	£99.99	Commodore
MPS-801	Impact dot matrix (uni-hammer method). Max print speed 50 cps. Pin feed. Max paper width 10″. Serial interface.	64, VIC 20, 16, +4	£230.00	Commodore
MPS-802	Serial impact dot matrix. Max print speed 60 cps. Pin feed and friction. Max paper width 10″. Serial interface.	64, VIC 20, 16, +4	£345.00	Commodore
MCS-801	Colour dot matrix. Max print speed 50 cps. Tractor feed.	64, VIC 20, 16, +4	£399.99	Commodore
DPS-1101	Daisywheel (Triumph Adler compatible) letter quality. Alternative type faces available such as italics, gothic and pica. Max print speed 18 cps. Friction feed. Max paper width 13″.	64, VIC 20, 16, +4	£399.99	Commodore
Riteman C+	9 × 7 dot matrix. Max print speed 105 cps draft. Max paper width 10″.	64, VIC 20, 16, +4	£240.00	C.Itoh
Ibico LTR-1	Ink roller, friction feed. Max print speed 12 cps letter quality. Max paper width 8½″.	64, VIC 20, 16, +4	£119.95	Saga
HR-5	Thermal printing 9 × 9. Max print speed 30 cps. Max paper width 80 columns.	64, VIC 20	£110.00	Brother
P-40	Dot matrix 9 × 6. Max print speed 45 cps. Max paper width 40 columns. Parallel or serial interface.	64, VIC 20 (needs 'black box')	£86.91	Epson
Rotronics DX-85	9 × 9 dot matrix. Max print speed 120 cps draft. NLQ available. Max paper width 80 columns. Friction and pin feed and automatic and single sheet loading. Bit-mode (graphics) operation allows printing of graphs and special tables.	64, VIC 20	£233.95	Rotronics
SG10C	Specifically for Commodore machines. 9 × 11 dot matrix. 2K buffer. Max print speed 120 cps draft. NLQ mode. Max paper width 10″. Detachable tractor feed. Parallel interface with option of serial interface.	64, VIC 20, 128	£225.00	Star
SD10	9 × 11 dot matrix. Friction and tractor. 2K buffer. Max print speed 160 cps draft. NLQ mode. Max paper width 10″.	64, VIC 20 (needs 'black box')	£389.00	Star

ADD-ON GUIDE

PRINTERS/PLOTTERS

Product	Features	Commodore Machine	Price	Company
SD15	As above. 16K buffer. Max paper width 15".	64, VIC 20 (needs 'black box')	£489.00	Star
The Powertype	Daisywheel printer (Qume). Parallel interface and also built-in serial interface. Max print speed cps.	64, VIC 20 (needs 'black box')	£379.00	Star
Seikosha GP-100VC	Designed for Commodore machines. 80 column dot matrix. Max print speed 50 cps draft. No NLQ mode. Max paper width 10". Tractor feed.	64, VIC 20	£115.00	DDL
Seikosha GP-1000VC	12 × 9 dot matrix. Max print speed 100 cps draft. NLQ 20 cps. Tractor feed. Max paper width 10".	64, VIC 20, 16, +4	£279.00	DDL
MT-80	9 × 8 dot matrix. Can handle all the Epson codes. Max print speed 100 cps (uses square 'needles' for good print quality). Max paper width 10".	64, VIC 20 (needs 'black box')	£217.00	Mannesman Tally
P-80	9 × 6 dot matrix. Single sheet feed. Max print speed 45 cps draft. Max paper width A4. Parallel and serial interface.	64, VIC 20, 128 (needs box)	£160.00	Epson
P-80XS	24 × 18 dot matrix. Single sheet feed. Max print speed 45 cps draft, 22.5 cps correspondence. Max paper width A4. 2K buffer. Single sheet feed.	64, VIC 20, 128 (needs box)	£250.00	Epson
LX-80	18 × 12 dot matrix. Single sheet and continuous with Automatic Feeder optional. Max print speed 100 cps draft, 16 cps correspondence. Max paper width 254mm. 1K buffer. Parallel centronics standard.	64, VIC 20, 128 (needs box)	£255.00	Epson
H-180	10 colour Printer Plotter. Graphs, solids, outlines or cross hatching. Matt, gloss paper and film. A4. Parallel centronics standard. Serial optional.	64, VIC 20	£400.00	Epson

PRINTER/BUFFERS

Product	Features	Commodore Machine	Price	Company
Comprint	Will fit inside a Printer, allows full use of Printer features and full use of Commodore features. 2K buffering. Boxed version	64, VIC 20, +4	£61.99 £99.50 incl.	A-line Dataspeed

INTERFACES

Product	Features	Commodore Machine	Price	Company
Superbox 64	Expansion unit which features three independent cartridge slots, IEEE interface that is totally transparent. Reset switch activates cold start on computer. Will connect up to 3 cartridges at the same time.	64	£67.85	Handic

Interfaces (cont)

Product	Features	Machine	Price	Company
The Commodore Connexion	Software package and cable enables the 64 user to link the computer to any standard centronics printer. Has two modes – a 'normal' mode providing carriage control facilities and 'mode 2' for printing characters direct. Does not interfere with user memory.	64	£19.95	SMC
Comprint	Two internal versions (Epson and Canon), just plug in and connect cable. 2K buffer storage.	64, C.16	£61.99	Micro Control
	8K buffer storage.		£80.50	
	Stand alone version.		£99.50	
92000	Interface/buffers allows connection of a printer with a centronics interface to Commodore 64. Connection is made via the serial port and thus no driver program is necessary, no buffer memory is taken up and the user port stays free.	64, C.16, C.128, +4	£47.50	FCC
92008	As above, 8K buffer.	64, C.16, C.128, +4	£59.99	FCC
92000/G	In addition is able to print all CBM special characters, block graphics, CBM single point graphics etc. Built-in DIL switches.	64, C.16, C.128, +4	£59.99	FCC
92008/G	As above with 8K buffer.	64, C.16, C.128, +4	£64.99	FCC
Interpod	Full IEEE and RS232C communication. Can accomodate 1541 d/d, 8050 and 4040 disk.	64, VIC 20	£59.95	Cheetah
The Connection	Fully intelligent Parallel Printer Interface designed exclusively for Commodore computers. Plugs into the disk (serial) socket and translates Commodore ASCII to standard ASCII. Provides two modes. 2K buffer. Also features an on-board printer test to isolate problems.	All	£84.95 for the Epson version £79.95 for all other models	Tymac
PRINT 64	Serial IEEE to Centronics interface. Two leads, one plugs into the serial port on either the computer or the disk drive and the other into the printer. Includes Supply Connector Lead for cassette port. Commodore graphics characters, normal and inverted. Can assign any PRINT 64 function to any program's secondary address.	64	£76.95	Jansen
Ibek Interface	Built-in functions.	64	£59.95 + VAT	Data Star
Trippler Interface	Built-in functions.	64	£45.00 + VAT	Data Star
Parallel Interface	Compatible with existing software; plugs in direct; device number can be altered; 16K printer buffer option	64, VIC,	£44.95	Zero Electronics
Super Graphix	8K buffer; 10 printing modes re-set button; internal fonts	64/128	£49.95	Screens

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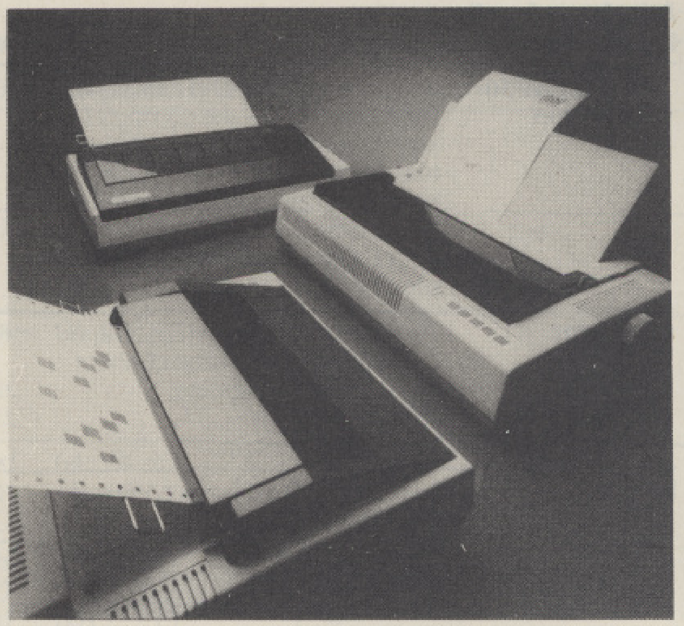

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CITIZEN	MSP15	£500.00	**£400.00**
CITIZEN	MSP20	£555.00	**£444.00**
CITIZEN	MSP25	£700.00	**£560.00**
JUKI	6100	£399.00	**£280.00**
JUKI	6200	£499.00	**£350.00**
JUKI	6300	£899.00	**£630.00**
JUKI	5520 (colour)	£399.00	**£315.00**
JUKI	5516	£299.00	**£229.00**

MODEHART LTD, Unit N3, Renshaw Trading Estate, Millmead, Staines, Middx, TW18 4QU.
Tel: Staines (81) 62405/6. Telex No. 8951182 GECOMS G

ADD-ON GUIDE

MODEMS

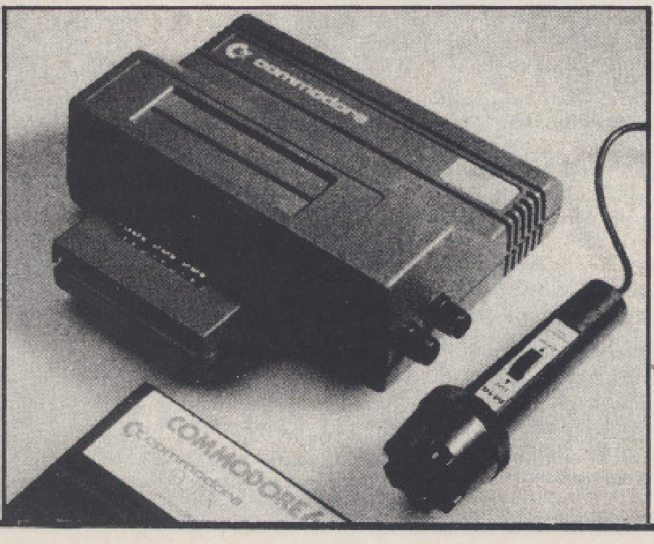
Product	Features	Machine	Price	Company
TM 110	1200/75 bps V23 full duplex mode. Able to store and access data in its own CMOS RAM. RS232 micro interface, auto-dial/auto-recall and auto transmission of ID. Up to 8 telephone numbers can be stored.	64, VIC 20	£99	Tandata
TM 200	Includes all the features of the TM 110 and in addition to 1200/75 baud full duplex also offers 75/1200 bps full duplex, 1200/1200 half duplex to allow two micros to 'chat' and 300/300 bps full duplex with answer and originate mode allowing use with many conventional databases.	64, VIC 20	£173	Tandata
Modem 1000	Can access Prestel, Micronet, with option to access B.T. Gold and 1275 Bulletin boards. Free quarter's subscription to Micronet with every purchase from Modem House.	64, 128	£99.95	Modem House
WS 2000	Single-unit multi-standard, multi-speed, offering a very wide choice of operational facilities. Can transmit and receive at 300 baud full duplex, 600 baud half duplex, 1200 baud half duplex and Prestel/Telecom Gold.	All with RS232/serial interface	£129.95	Miracle Technology
WS 3000 V2123	Fully intelligent, keyboard-instructed, autodialling, auto-answering. Supports both CCITT and Bell standards, 60-number internal telephone directory, speed buffered RS232 port. Allows 300, 600, 1200, 1200/75 and 75/1200 baud rates.	All with RS232/serial interface	£295.00	Miracle Technology
WS 3000 V22	Adds 1200 baud full duplex	All with RS232/serial interface	£495.00	Miracle Technology
WS 3000 V22bis	Adds 2400 baud full duplex. Protect 3000 Data Security Option £98 when purchased with modem.	All with RS232/serial interface	£650.00	Miracle Technology
Commodore Communications Modem	1200/75 V23 full duplex, asynchronous operation. Easy to fit, easy to use. Connection direct to the cartridge port of a 64 and direct to a British Telecom series 600 socket. Compunet software held in ROM (8k) for immediate interaction after switch on. Soft load options provide 64 to 64 direct communication. One year's free subscription to Compunet	64	£99.99	Commodore
Multimodem	Multi-speed, baud rates of 300/300, 1200/75, 75/1200. Auto-dial, auto answer, auto-mailbox	64	£98.50	Miracle
Tm512E	Auto-dial, auto-answer	64	£339	Tandata
Voyager	Operates V21 and V23. Auto-dial, auto-answer, optional add-ons	64	£79.95	Modem House

MUSIC ADD-ONS

Product	Features	Machine	Price	Company
Music Maker	Starter program. Turns 64 into keyboard.	64, 128	£19.99	Music Sales
Playalong Albums	3 available: Pop, Classics, Beatles. 12 songs. Auto playback or will teach to play melody.	64, 128	£9.99	Music Sales
Sound Studio	2 programs in 1. (1) Turns computer into synthesizer. On screen controls. 60 sounds in memory. (2) Sound recording studio (3 channels). Real step time.	64, 128	£14.99	Music Sales
Sound Sampler	Hardware & software package with audio lead and mike. Samples and digitizes sound. Editing facilities. Pitch sampler. Drum & echo facilities.	64, 128	£69.99	Music Sales
Sound Expander	Hardware & Software package. Gives 64 extra sounds. Turns computer into generator using F.M. technology. Enables 11 voices to be used at one time. Easy play features built in.	64, 128	£99.99	Music Sales
Syntron Digidrum	Hardware/software package. Using 64 'live' or real recorded drum digital samples the Digidrum allows patterns and songs to be built up and recorded. Software comes complete with 16 samples, 8 standard kit and 8 glass samples. Demo songs and patterns provided. Audio and trigger outputs.	64	£65.00 incl.	Syndromic
Sound Set 1	Disk containing over 50 new samples for Syntron Digidrum. Latin and Syndrum kits plus full selection of tom-toms, sweep, pitchbend toms, cymbals, hihats, Latin effects and syndrum effects. Also in cassette.	64	£16.50	Syndromic
Digital Music System (Microsound)	Designed to provide the ability not only to play back the sampled sounds at various pitches, but also to create complex sounds using Dynamic Amplitude Modulation, Definable Pointer sets, Looping, Reversing, and mixing different sample sounds. Keyboard is a full size 4 octave unit that connects to the 64 via the games ports and requires no external power supply. The Sound Control Program provides a complete display of the status of the synthesizer, together with a comprehensive set of single key commands for control while playing.	64	£165.22	Autographics

ADD-ON GUIDE

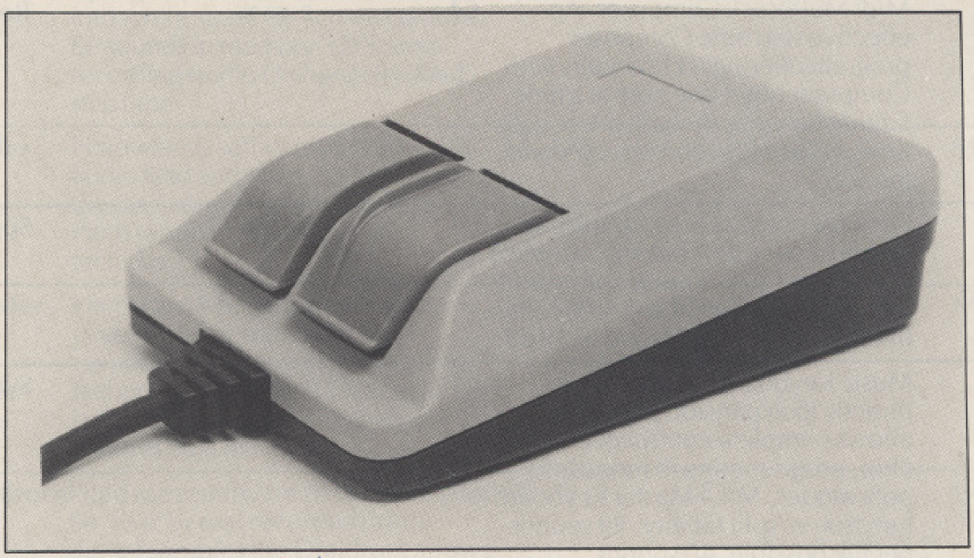
Product	Features	Machine	Price	Company
RMS 6H	JMS Midi Master Synchronizer allows synchronisation of conventional trigger signals and Sync Signals with MIDI synchron code. All Sync Codes are available simultaneously at the outputs, with each capable of controlling several devices. Also incorporates Sync To and Sync From tape.	64	£ 239.00	Rosetti
RMS 20C	Midi Multitrack Composer. An effective step time Composer program offering six channels with Computer input one note at a time. Editing facilities include pitch, gate time, velocity, sound changes and transfer.	64	£ 49.95	Rosetti
Microvox	Package consists of sampling unit, system disk (with 'start-up' samples) and Library disk. The sampling unit has two programmable 24dB/octave filters and gives a S/N ratio of 59 dB.	64	£229.95	Supersoft
Siel CMK 49	Music Keyboard, 4 octaves, fits directly to expansion port, software allows complete control over SID chip, programming in mono and poly modes, MIDI Master Keyboard function w/split facility, 99 sounds per file possible, 40 sounds immediately available, demo songs.	64	£125.00 incl.	Syndromic
Siel Sound Buggy	Comes complete with overlay clip-on keyboard but can be controlled via the CMK 49 keyboard. Allows the user complete control over a new sound chip, programmable sounds, rhythms, single finger/fingered chords, split keyboard, auto-accompaniment includes arpeggio, bass, vibrato, memory plus chord and melody sequencer, demo songs, sounds and rhythms already programmed, MIDI facilities include Receive/Transmit plus channel and program change for four individual MIDI lines	64	£99.00 incl.	Syndromic



ADD-ON GUIDE

MUSIC ADD-ONS

Datel Sampler	Hardware incorporates full 8-bit D to A and ADC conversion. Software includes sample editing	64	£49.99	Datel
MCS	Combines interface, MIDI link and comprehensive disk software	64	£245	Joreth Music
AMS	Editor, keyboard, linker synthesiser and MIDI modules	64/128	£39.95	Rainbird



Lightpens

	Features	Commodore Machine	Price	Company
Datapen	Buff casing, no interface needed	64, VIC 20	£25.00	Datapen
Trojan Lightpens	Black. Will draw freehand, can magnify or reduce, can fill in with either colour or 2 different patterns	64, VIC 20,	£17.25	Trojan

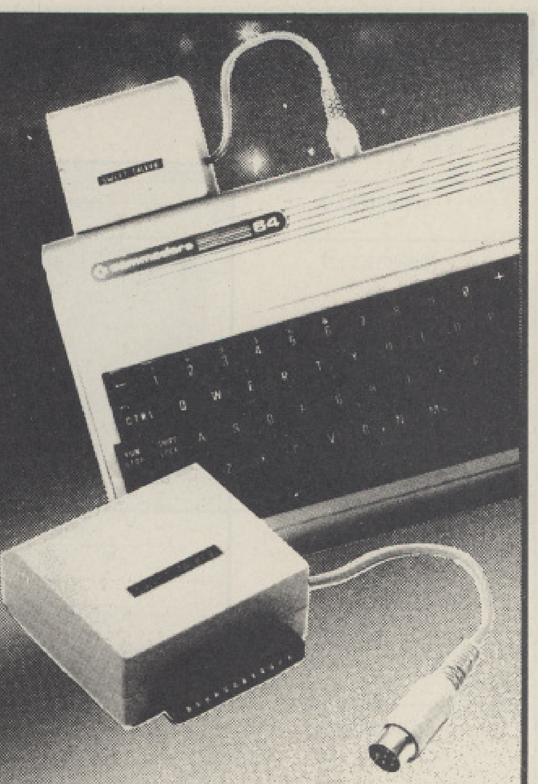
Graphics Tablets

	Features	Commodore Machine	Price	Company
Grafpad II	Use to design circuit diagrams, mechanical engineering & kitchen designs, in general CAD packages	All	£44.95 (interface £23.95)	British Micro
The Touchmaster	A4 size surface which generates coordinates. Free graphics program, can fit different overlays	All	£99.00 (including interface, pad, stylii & overlay)	Panorama
Super Sketch	Graphics tablet with many features, which comes complete with Starter Kit	64	£51.95	Anirog

Mice

Datex Mouse	Mouse, tape & disk software	64	£76.00	EEC
The Magic Mouse	Mouse, tape & disk software	64	£59.95	SMC
MS 2000 V	Optical encoding and a comprehensive cassette-based software		£69	Wigmore House

COMMODORE SWEET TALKER

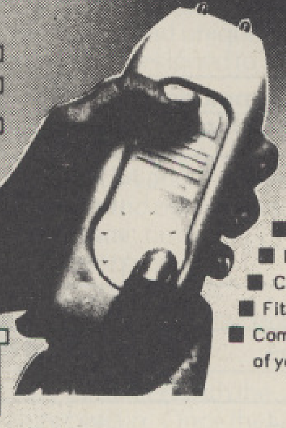


THE CHEETAH "SWEET TALKER" JUST PLUGS I[illegible] THE BACK OF THE COMMODORE 64 BASED O[illegible] ALLOPHONE SYSTEM, YOU CAN EASILY P[illegible] ANY WORD, SENTENCE OR PHRASE CR[illegible] EXCITING SPEECH AND BROADCASTING IT THROUGH YOUR T.V. FULLY CASED, TESTED AND [illegible]

[illegible] "SWEET TALKER" COMES COMPLETE WITH [illegible] TAPE AND FULL EASY TO FOLLOW [illegible]TIONS.

Mind blowing at only £24.95

THE AGE OF THE R.A.T



JOYSTICKS!..........

The Cheetah Remote Action Transmitter is the most sophisticated computer contoller available

It has these features:

- InfraRed transmission–so there are no leads trailing across the living room. Just sit back in your chair up to 30 feet from your machine.
- Touch control–no moving parts, extremely fast, long life.
- No extra software required.
- Can be used with all Commodore Joysick software.
- Fits comfortably in your hand for long play periods.
- Comes complete with receiver/interface unit which simply plugs into the rear of your Commodore.

***Simply incredible at* £19.95**

Cheetah Marketing

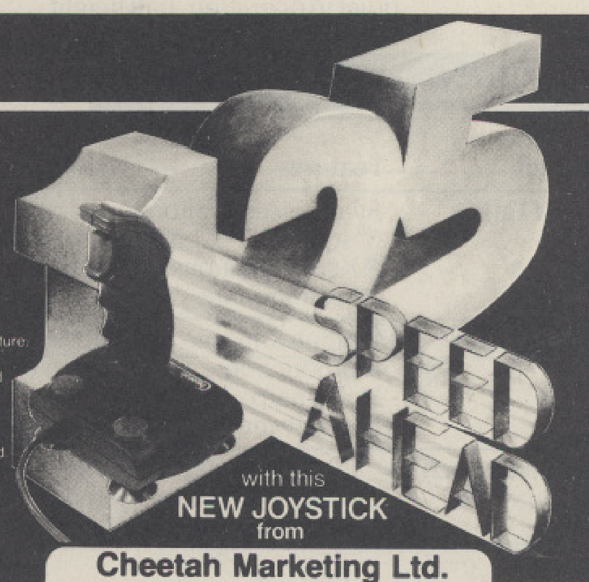
are proud to announce the arrival of their 125 Joystick

Compatible with ZX Spectrum, Commodore 64, Vic 20, Amstrad, Atari, MSX, etc.

At only £8.95 the features on the 125 are second to none. Besides its unique internal structure, built to withstand immense punishment from even the most vigorous games player, the joystick contains no less than four extremely sensitive fire buttons. Two are housed in the handgrip which has been moulded for extra comfort and ease of operation. The trigger finger fire button provides ease and comfort for your finger and the top fire button is contoured to fit your thumb for sure fire shooting. The base fire buttons are positioned for extra control and two hand firing whether you are right or left handed. A built in auto-fire switch provides continuous shooting at the touch of a fire button.

The 125 comes complete with a full 12 months warranty and is available from High Street stores and all good computer shops.

ONLY £8.95



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NEW JOYSTICK
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Cheetah Marketing Ltd.

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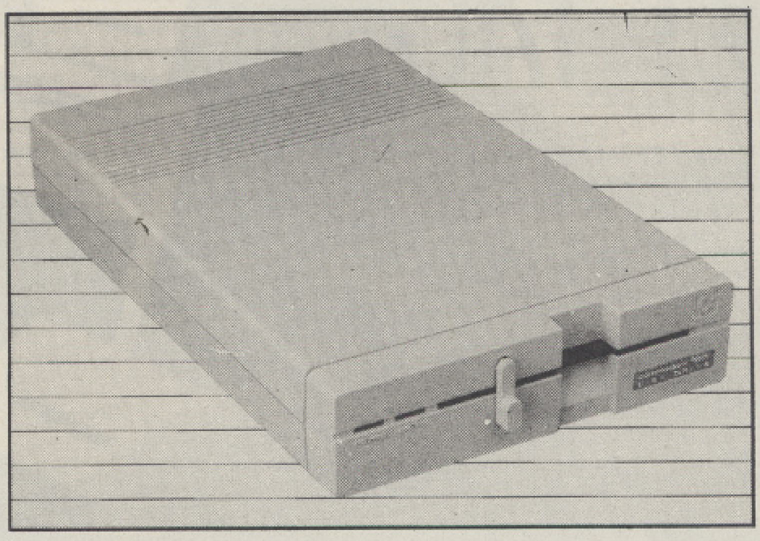
Cheetah, products available from branches of [illegible] WHSMITH



Disk/Wafer Drives

Product	Features	Commodore Machine	Price	Company
1541	Single disk drive unit, provides greater storage capacity (170 Kbytes) – faster retrieval than a cassette unit	64	£199.99 (with dot matrix printer)	CBM UK
Wafer drive	High speed load	64	£59.95	Micropride
Triton Quick	Disk drive – takes 8 secs. to load a 48K program	64	£119.95	Radofin
Quick Data Drive	Quick loading, uses an endless loop of video quality tape	64	£49.95	Dean
Enhancer 2000	2½ times faster than the 1541 only on the raw data transfer	64	£229.95	Commotion
1571	Double-sided, fast access times, quiet in operation, half height	128	£249	Commodore

Speech Recognition & Synthesis

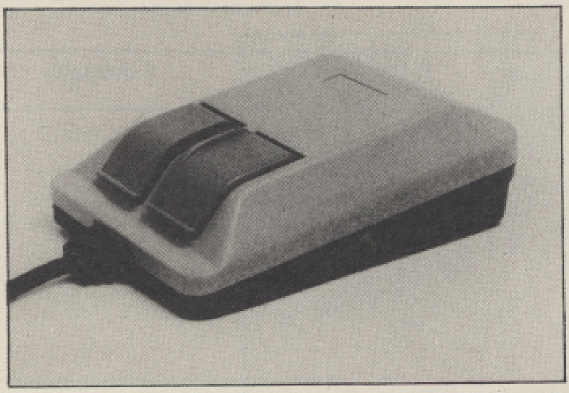
Product	Features	Commodore Machine	Price	Company
Sweet Talker	Synthesiser — allophone system, 3" square, 1½" high, gives examples & demonstrations. Shape & colour as Commodore	64	£24.95	Cheetah
Voicemaster	Unique 3-in-one package, speech reproduction, speaks in own voice. Voice harp – just whistle or hum to produce music	64	£59.95	Anirog
Currah Speech 64	"Y" cable available, converts text to speech direct from screen, uses allo-phones system, infinite vocab.	64 (compatible with C128)	£21.95	Welwyn Electronics

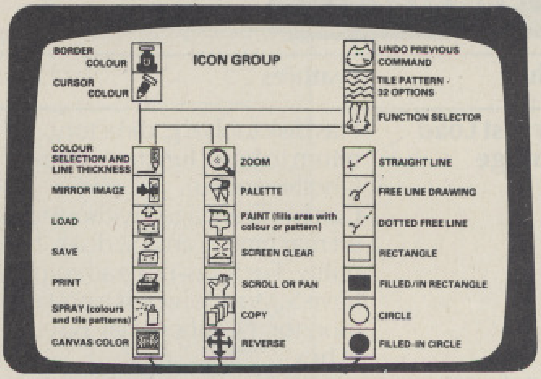
ADD-ON GUIDE

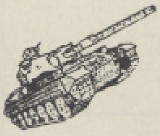
SPEED LOADERS

Product	Features	Machine	Price	Company
Epyx Fast Load Cartridge	Has disk tools e.g. directory, return to basic function, copy (another menu). Can be disengaged without turning off machine. Can adit disks, has a file utility, For trans-programming you have S.Mon. which is a powerful monitor. Numbers may be entered in hex.	64, 128	£24.95	Centresoft
Robcom Turbo range	Alignment tape kit included in package. 8 pre-programmed function keys. 16 different tape and disk commands. Conversion of all graphic and control codes into readable text. Re-set switch.	64, 128	From £24.95 to £39.95	Centresoft
GTL 1	This cartridge enables your 1541 disk drive to load 4-5 times faster. Many useful features including abbreviated load/save commands and unique on/off switching etc. Designed to work with most games.	64	£20.00	Trilogic
GTL 2	As above with built-in reset switch	64	£22.00	Trilogic
Quickdisc +	Cartridge plugs inot 64 and 1541. Can be switched in and out from the keyboard. Fast format, fast backup, fast file copier. Reset switch. Improved DOS commands. Is compatible with printers and second drives. Cure for 'save @ bug'.	64	£19.95	Evesham
Turbo 64	A disk specially formatted with the fast load feature built in. Once the disk is made it will load on any unmodified Commodore 64 and 1541 disk drive without having to load anything first. Loading time is 5 times faster and programs can be selected and run from a menu by the press of a single key. To make a Turbo 64 disk all you do is copy the programs from your source disk onto the specially formatted Turbo 64 disk using the Editor.	64	£16.99	Cockroach
Warp 5	Disk – will load any program 5 times faster than normal. Has DOS 5.1 commands e.g. type $ and get directory. Unique Header Editor. Utility to allow disk drive to play music e.g. God Save The Queen.	64, 1541	£9.95	MPS
Toolkit IV	Disk with comprehensive manual. Can recover corrupted sectors. Fast format (10 secs.) Can change about 30 parameters before format. Fast copy (full disk is under 2 minutes). Fast file copier.	64	£22.95	MPS
1541 Express	Cartridge – two leads clip inside the computer. Works with most business software.	64	£34.95	Ram

MS 2000 COMMODORE MOUSE




BORDER COLOUR
CURSOR COLOUR
ICON GROUP
UNDO PREVIOUS COMMAND
TILE PATTERN - 32 OPTIONS
FUNCTION SELECTOR
COLOUR SELECTION AND LINE THICKNESS
MIRROR IMAGE
LOAD
SAVE
PRINT
SPRAY (colours and tile patterns)
CANVAS COLOR
ZOOM
PALETTE
PAINT (fills area with colour or pattern)
SCREEN CLEAR
SCROLL OR PAN
COPY
REVERSE
STRAIGHT LINE
FREE LINE DRAWING
DOTTED FREE LINE
RECTANGLE
FILLED/IN RECTANGLE
CIRCLE
FILLED-IN CIRCLE



The MS 2000 is a beautifully designed peripheral used to move the cursor simply and quickly around the screen like a drawing pen, paint brush or air spray. This popular device is so natural and friendly to use that it will add an exhilerating new dimension to creative art, CAD, design and business drawings such as graphs, pi charts and plans. Full 16 colour simultaneous drawing and painting facility.

The MS 2000 is a high quality mouse with a RUBBER COATED BALL which is quiet and will not lose accuracy through slippage. The hardware incorporates an OPTICAL ENCODING technique in the mouse which has a resolution of 100 points to the inch. It is accurate, reliable and repeatable.

ONLY £64.90 INCL. MS2000 + CASSETTE. DISK OPTION £3.50 (£1.50 p&p)

Compunet **"must be the best"**
Popular Computing Weekly **"hardware excellent, software technically stunning"**
Commodore Horizons **"certainly the best Mouse for the C64"**

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FOR COMMODORE 64 AND VIC 20 MICROCOMPUTERS
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☐ MICRO BUFFER
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☐ SUPPORT MOST MAJOR PRINTERS
☐ 100% COMPATIBLE WITH SOFTWARE FOR VIC 1525 PRINTER
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PRICE **£49.95** (inc. VAT) Post & Packing **FREE**

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☐ 8 K BUFFER STANDARD
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☐ CORRECT GRAPHICS / TEST ASPECT RATIO FOR ALL MAJOR PRINTERS
☐ 8 OCTAVE SWITCHES WITH CHANGES CONSTANTLY MONITORED
☐ INTERNAL FONTS SUPPORT, SUPER SCRIPT, SUB SCRIPT, UNDERLINING, BOLD FACE AND CHOICE OF 9 PITCHES

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ADD-ON GUIDE

Joysticks / Trackerballs

Product	Features	Commodore Machine	Price	Company
Formula I	Bright blue, 2 fire buttons, microswitch	64, VIC 20	£16.95	Kempston
Formula II	Bright blue, 3 fire buttons, leaf switch	64, VIC 20	£11.95	Kempston
Sure Shot	Black & red, 2 fire buttons	64, VIC 20	£15.95	Cookridge
Sure Shot Supreme	Black & red, 2 fire buttons, one on handle	64, VIC 20	£17.95	Cookridge
Zipstick	Black & red, 2 fire buttons	64, VIC 20, C16	£12.95	Cookridge
RB II Marconi	Tackerball with software — cassette or disk	64, VIC 20	Cass £59.50 Disk £69.50	Central Trade Exchange
Competition Pro 5000	Black, 2 fire buttons	64, VIC 20	£13.50	Dynamics
Formula I	Blue, 2 fire buttons	64, VIC 20	£16.95	Dynamics
Commodore Joystick	Cream, one fire button on base	64, VIC 20	£7.50	CBM UK Ltd
Commodore Joystick	Charcoal black, one fire button on top of handle, contoured, very sensitive	C16, Plus 4	£9.99	CBM UK Ltd
The Stick	Black & red, hand-held, no base, 2 fire buttons, good with sports games & flight simulation	Fits all with 9 pin D-type connector	£12.99	Lightwave
Delta 3SC	Black, or black with red stripes, 3 fire buttons, light fast action	64, VIC 20	£10.00	Voltmace
Computec	Black, 2 fire buttons	64, VIC 20	£9.95	Micropride
Atari Joystick	Black, one fire button	64, VIC 20	£7.99	Atari
Atari Trakball	2 buttons, rolling ball in centre	64, VIC 20	£9.99	Atari
Vulcan Gunshot I	Cream & beige, 2 fire buttons, suction pad underneath	64, VIC 20	£7.95	Vulcan
Vulcan Gunshot II	Black, 2 buttons, autofire, suction pad underneath	64, VIC 20	£9.95	Vulcan
Quickshot 1	Black & red, 2 fire buttons	64, VIC 20	£6.95	Spectavideo
Quickshot 2	Black & red, 2 fire buttons, autofire	64, VIC 20	£9.95	Spectavideo
Quickshot 4	Black & red, 2 fire buttons, choice of 3 different handles	64, VIC 20	£13.95	Spectavideo
Quickshot 6	Long base, 3 fire buttons, 2 on handle	64, VIC 20	£9.95	Spectavideo
Quickshot 7	Joycard – 2 buttons on sides, thumb control, 2 lights l.e.d.	64, VIC 20	£10.95	Spectavideo
Quickshot 9	Joyball – half sphere on large base, microswitches, 2 big fire buttons at bottom of unit. Players 1 and 2 switches, autofire. Cream & brown.	64, VIC 20	£13.95	Spectavideo
Hotshot (REVS)	Analogue, designed for Firebird game. REVS, also switchabale to normal, one fire-button	64	£12.95	Meedmore

THE FINAL CARTRIDGE

THE FIRST OUTSIDE OPERATING SYSTEM FOR THE CBM 64 *

UTILITY
OF THE YEAR
1985
THE CCI
OSKARS
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THE FINAL
CARTRIDGE
HOME & PERSONAL COMP
£45

This new operating system built in a cartridge does not use any memory and is always there. Compatible with 98% of all programs.

DISK TURBO - 6 times faster loading - 8 times faster saving.

TAPE TURBO - 10 times faster, even with files - normal Commodore commands - compatible with standard turbo's.

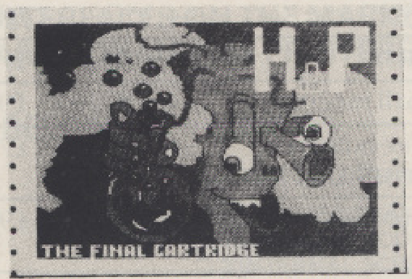
ADVANCED CENTRONICS INTERFACE - compatible with all the well-known centronics printers and Commodore printer programs. Prints all the Commodore graphics and control codes (important for listings).

SCREEN DUMP FACILITIES - of low-res Hi-res and multicolour screens!! Prints full page with 12 shades of grey for multicolour pictures even from games and programs like Doodle, Koala pad, Printshop etc. Searches automaticly for the memory-address of the Picture. Special version available for the CBM 801 and 803 printers.

24K EXTRA RAM FOR BASIC-PROGRAMS AVAILABLE: Two new commands ,,Memory read'', ,,Memory write''. They move 192 bytes with machinelanguage-speed anywhere in the 64K Ram of the CBM 64. Can be used with strings and variables.

BASIC 4.0 COMMANDS - like Dload, Dsave, Dappend, Catalog, etc.

BASIC TOOLKIT - with Auto, Renum (incl. Goto and Gosub), Find, Help, Old, etc.



Original multicolour full page screen dump print out.

PREPROGRAMMED FUNCTION KEYS: Run, Load, Save, Catalog, Disk commands, List (removes all list-protections).

KEYBOARD EXTRA'S - Allows you to delete part of a line; stop and continues listings; move cursor to lower lefthand corner. Pokes and Syscalls in Hex. Typ-command operates your printer as a typewriter.

COMFORTABLE EXTENDED ML. MONITOR: - with relocated load scrolling up and down. Bankswitching, etc. - **does not reside in memory.**

RESET SWITCH: - resets to monitor; resets with old, resets to Hi-res printing; resets every protected program.

ON/OFF SWITCH - we hope you never need that one.

FREEZE FRAME

Stops and continues almost every program and allows you to make a **total back up** to disk or tape automatically.

14 Days money back guarantee if you are dissatisfied.

12 Months replacement guarantee.

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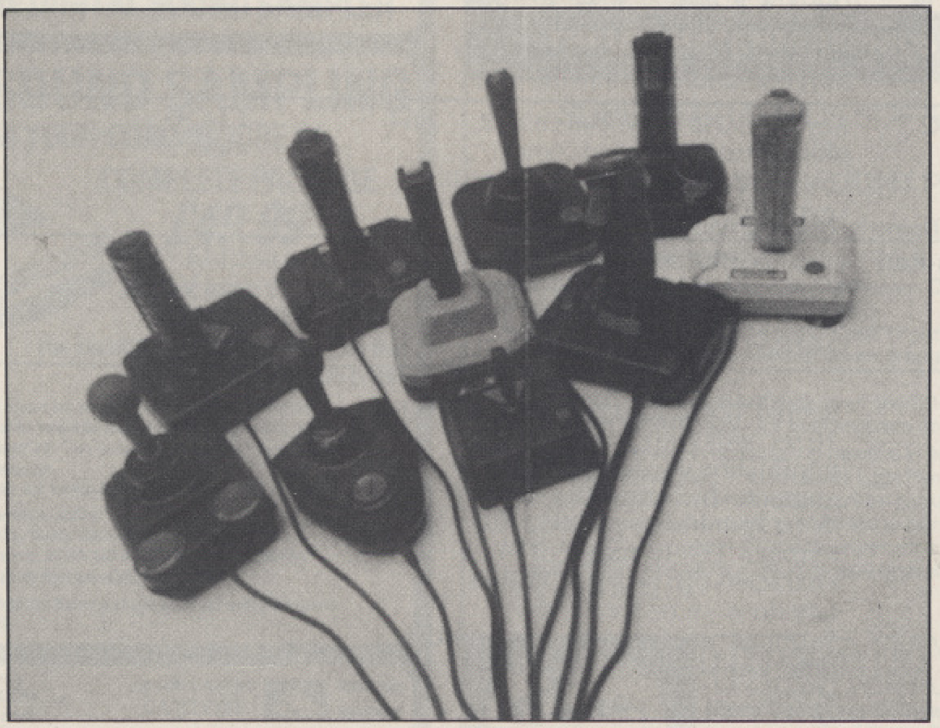
* works with C128 in the 64 mode.

ADD-ON GUIDE

Joysticks / Trackerballs

Product	Features	Commodore Machine	Price	Company
Turbo Ace	Fire button on steering wheel, speed regulation and centralisation autofire facility	64	£29.95 + £1.50 delivery	Apollo
Ballpoint	Icon manipulation 16 colours (any 4 usable at once), sections of drawings may be picked up & moved, drawings compatible with light pen drawings, optical trackerball, trackerball or joystick.	64	£39.95	Meedmore
Champion	Built-in autofire, 2 fire buttons	64 (C16 & Plus 4 via interfacing)	£9.99	Baylin
Boss	Grey with black handle, heavy duty construction with split second reaction	64 (C16 & Plus/4 via interfacing)	£15.99	Baylin
Bat Handle	Dual fire button	64 (C16 & Plus 4 via interfacing)	£27.99	Baylin
Super 3-way	Control customized for any game, dual fire buttons, direction option, 4 & 8 position, 3 arcade handles	64 (C16 & Plus/4 via interfacing)	£32.99	Baylin
Mach 1	Black with three red buttons. Moulded handgrip and an autofire switch	64, VIC 20	£8.95	Cheetah
Speedking	Hand-held, moulded case, one trigger-fire button	64	£12.99	Konix



MOTHERBOARDS

Stack	4 slot motherboard (adaptor). Has a unique switching system for each of the 4 cartridge slots which allows the user to turn on and off cartridges without removing them from the computer. Vertical cartridge mounts to give compactness in use and ease of access for fitting and removal.	64, VIC 20	£28.00	Meedmore

DIGITISERS

Computereyes	It will digitise from camera, video recorder, video disk and images can be stored on disk. Also enhancements to allow the use of computereyes with some of the popular graphic packages for the Commodore.	64	£139.00	Stem
SCAN-64	Digitizer plus graphics editor. Comes as a set with optical scanner and mounting bracket, diskette, cable and manual. The function keys open various editing modes with extremely useful commands.	64	£89.50	Jansen

MISCELLANEOUS

Product	Features	Machine	Price	Company
Rotronics Portable Case	Smart, executive style case with removable lid. Individually tailored foam insert securely protects micro and cassette recorder during transit. Additional storage space in the lid holds manuals and up to twenty cassettes. All components remain fully operational within the case.	64, VIC 20	£34.49	Rotronics
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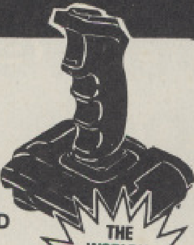

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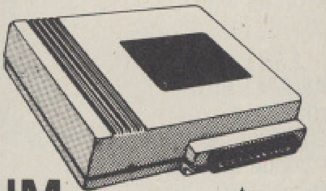

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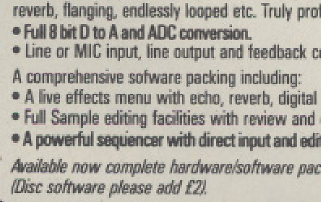

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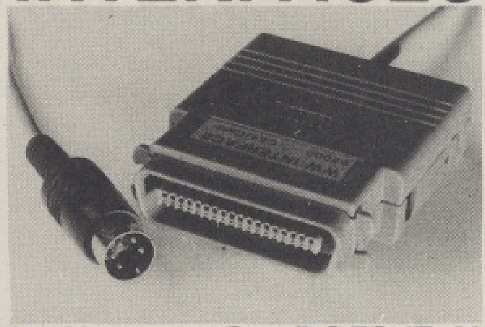

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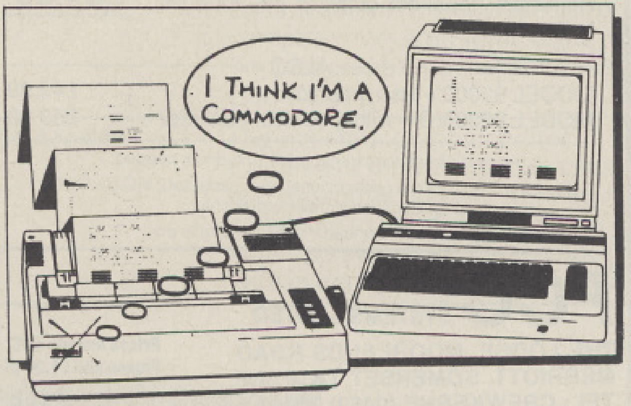
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6 Back To The Future	Electric Dreams	9.99	Iffy
7 Winter Games	Epyx	9.95	Awesome
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11 Transformer	Ocean	9.95	T.B.A.
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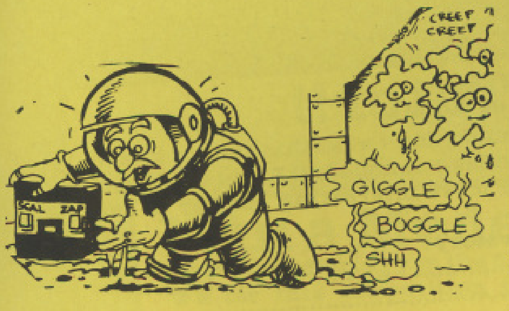
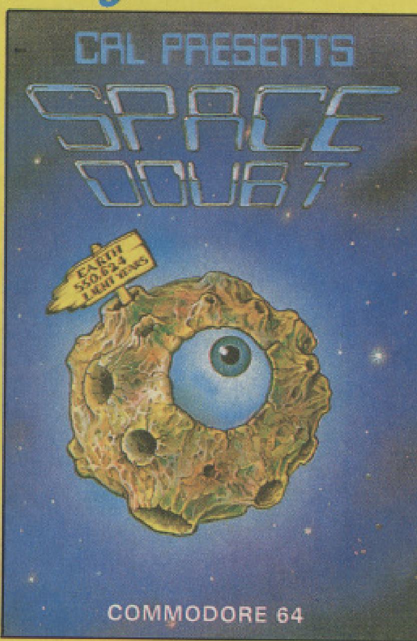




SPACE DOUBT

CRL's last release, Blade Runner, received massive amounts of hype, mainly due to its association with the Awesome film of the same name; unfortunately, when the game arrived, it turned out to be a pretty boring game, although it did have a good soundtrack.

Space Doubt has received very little hype – though I did give you a preview some months ago. To play the game you must first read the accompanying comic, which is really quite funny, if a little long winded. It explains that you are in control of USS Omnibus, taking cargo of food to the planet Niblondis.

All is not as easy at it may sound though as on the way your ship is attacked by Bogloids! These cute little creatures will make holes in the side of your ship, eat your vital food supplies, and even more seriously, they'll kill you. Your only chance is to use the Power Block to mend the holes and kill the Bogloids. Unfortunately your power block doesn't last forever, and to keep it going you must recharge it regularily.

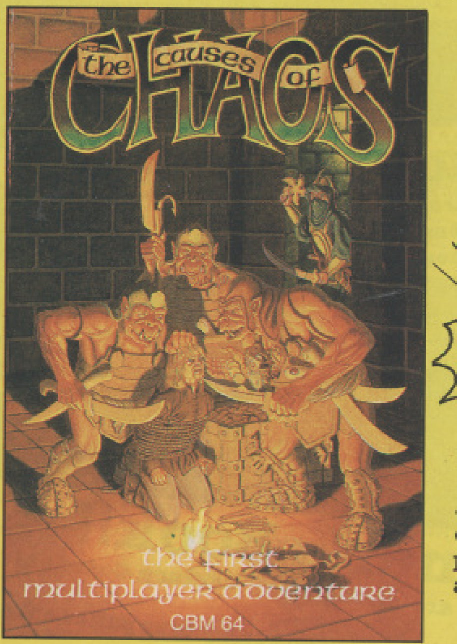
Graphically the game is nice, although really nothing amazing. The music, however, with its bursts of Close Encounters and James Bond, is really good – not up to Hubbard or Galway, but impressive nontheless.

If the game were priced at around £4, I would say that it could be a worthwhile purchase, but at £8.95 I feel it is just a little too repetitive to hold anyones attention for very long.

Price: £8.95
Graphics: ***
Sound: ****
Playability: **
CCI Rating: IFFY
Contact: CRL, CRL House, 9 Kings Yard, Carpenters Row, London E15 2HD. Tel:01-533 2918.

NAFF

THE CAUSES OF CHAOS.

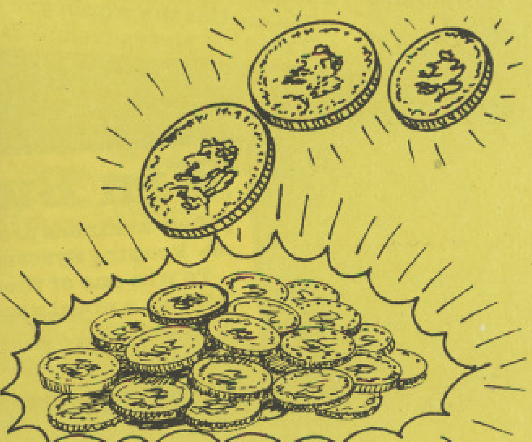


I've completely forgotten the name of the group that brought us the immortal song – 'Nice legs shame about the face!', but in many ways this game is the computer equivalent.

King Arnid the seventh, ruler of Ix, is having trouble: he's lost the crown jewels, and to stop the 'Causes of Chaos' from ruining the country you must rescue them for him!

What makes this game different from the average adventure is that it is multi-player. CRL have tried to capture the feeling of MUD (multi-user-dungeon) on your 64/128. To play the game with friends you must first choose how many of you want to play (1-6), enter your names, then be willing to turn your back each time another player is about to have his turn.

If this seems a little unrealistic to you then blindfolds might be a safer, if more time-consuming option. The Causes of Chaos can be played as a normal adventure, but apart from some very nice loading music, and a nicely redefined character set, it has no graphics – and thus loses out to Level 9 games ten times out of ten.



Overall TCC is a nice concept, and I really don't see anyway they could have improved the playability, but unfortunately the actual game lets it down!

Price: £8.95
Graphics: N/A
Sound: *** (Start-up tune)
Playability: **
CCI Rating: NAFF
Contact: CRL, CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD. Tel:01-553 2918.

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Q Name the two Super Powers.

A ....

Q Who resigned over the westland affair?

A ....

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Q What use could a computer be put to in a biology laboratory?

A ....

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Please list the words you can make on a separate sheet of paper.

I made ... words from 'PROCESSOR'

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Q Name a novel use for a home computer in a small business.

A ....

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....

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New to computing? We are giving away Century Communications' Commodore 64 Micro Guide.

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Q What does RAM stand for?

A ....

Q What does ROM stand for?

A ....

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We are giving away a copy of the game and a Force T-shirt to the first 10 correct entries pulled out of our competition sack. Just answer the following questions:

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A ....
Q Name the three most notorious mass murderers.
A ....
....

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A ....
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A ....

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A ....
....

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Age ....
Computer owned ....
Address ....
....

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C – Compare two blocks of memory.
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E – Examine memory contents.
F – Fill memory.
FM – Format a diskette.
G – Go at address.
GP – Go at program counter.
I – Basic Interpreter on/off.
J – Jump to subroutine at address.
JP – Jump to subroutine at PC.
L – Locate a string of bytes.
M – Move a block of memory.
P – Alter processor status register.
Q – Quit out of Ultimon!
R – Read from device.
S – Single step.
T – Trace through memory.
U – Display update mode.
W – Write to device.
X – One byte read.
– – Pop stack.
= – Push stack.
P – Dump screen to printer.
S – Cartridge on/off.
Alter 6502 registers
Link device type select
Link device number select

```
A X Y NV BDIZC 006A 02F4 0303 LINK
00 00 00 00000000 B0 E0 8A D1:S
PC BRKO BRK1 BRK2 BRK3 BRK4 BRK5
0000 0000 0000 0000 0000 0000 0000
SP 0101 00 00 00 00 00 00 00 00 00 00
01F6 CD D1 CC 02 E0 54 D4 C1 58 C0 90
AD 0000 00 00 FF FF 00 C0 00 FF ....@ ..
0008 00 00 0C C0 00 00 00 00 ...@...
0010 C0 80 00 00 43 00 00 0B @...C...
0018 00 00 00 00 30 00 00 00 ....0...
0020 06 01 03 01 15 F1 A3 F6 .....q£v
0028 00 00 0C 00 A3 F6 00 0C ....£v..
0030 8A 00 3E 02 3F 02 FF FF ..>.?...
0038 00 00 FF FF FF 00 00 00 ........
0040 00 03 00 00 00 00 00 00 ........
0048 00 00 FF 00 01 00 FE 00 .....~.
0050 80 00 00 27 10 25 00 00 ...'.%..
0058 40 7C 00 00 00 00 42 BC @!....B<..
0060 00 00 00 02 42 BC 02 00........ BL .........
0068 3F BC B0 00 00 02 00 7F ?<0.....
0070 00 00 00 00 00 00 00 00 ........
0078 00 00 00 00 00 00 00 00 ........
>
ULTIMON! (c) 1986 by John Lawson
```

```
A X Y NV BDIZC 006A 02F4 0303 LINK
00 00 00 00000000 B0 Eo 8A D1:S
PC BRKO BRK1 BRK2 BRK3 BRK4 BRK5
0000 0000 0000 0000 0000 0000 0000
SP 0101 00 00 00 00 00 000 000 00 00 00 00
01F6 CD D1 CC 02 E0 54 D4 C1 58 C0 90
AD F11B SEI 78 x
F11C LDX £FF A2 FF ''.
F11E LDA D209 AD 09 D2 –.R
F121 CMP £EC C9 EC I1
F123 BEQ F13A F0 15 p.
F125 LDA 0244 AD 44 02 -D.
F128 BEQ F13A F0 10 p.
F12A SEI 78 x
F12B DEX CA J
F12C BNE F12B DO FD P)
F12E DEY 88 .
F12F BNE F12B DO FA Pz
F131 LDA D508 AD 08 D5 –.U
F134 LDX £FF A2 FF ''.
F136 STX 07 86 07 ..
F138 LDX £00 A2 00 ''.
>D F11B
ULTIMON! (c) 1986 by John Lawson
```

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Mega-Review
DODGY

BASILDON BOND

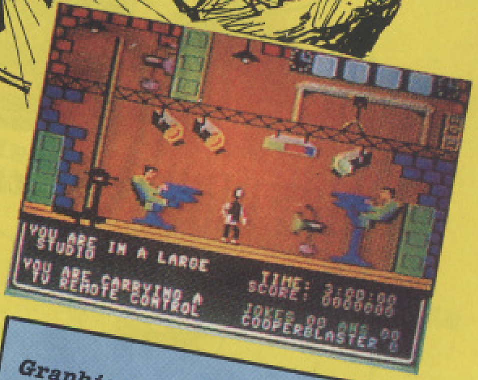
Basildon Bond

Personally I find Russ Abbot about as funny as being mugged, although my editor assures me he's a "very nice man". Anyway, getting away from my feelings about his comic ability and onto the game, which I really think I ought to!

Things did not start well. If there is one thing I dislike more than Russ Abbot's humour, it's his records, and sure enough this game loads accompanied by the dulcet theme of Russ' latest single. When the game eventually loaded I set about playing the game, in which you must rescue Russ from a rival comedy act (unfortunately you don't get any points for letting him die!).

As Basildon Bond you must travel around matching jokes to their answers. This is not as easy as it sounds, firstly because of the jokes and secondly because of the marauding cameras and shaking heads, which serve to make life very difficult. Before you can start on your quest however you must find a floppy disk so that you can turn the computer on (à la PCDOS).

Contrary to what you might think, this game isn't all bad! The graphics are O.K, with some smooth animation, and the sound, although it is only basic FX, is also quite good. If Impossible Mission had never been released this game might have been a real success, now however it is less likely.



```
YOU ARE IN A LARGE
STUDIO
YOU ARE CARRYING A
TV REMOTE CONTROL
                    TIME: 3:00:00
                    SCORE: 0000000
                    JOKES 00 ANS 00
                    COOPERBLASTER 0
```

Graphics: ***
Sound: **
Playability: ***
CCI Rating: DODGY

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C16 — The Choice is Yours

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Stay on dry land, don your stetson and become *Tycoon Tex, from Gremlin Graphics.* As a 'rootin, tootin' oil tycoon, your speedy draw will be frequently put to the test as you fight off bombs and missiles in order to complete your pipeline.

If land and sea aren't enough for you take to the air in *Skramble, from Anirog.* The year is 2184. Earth has been taken over by the Cobrons who have left a super intelligent command module in control. You have undertaken the suicidal mission of destroying the base. Good luck...you'll need it!

A space shooting gallery is the setting for *Anirog's Space Commander.* Gain a good rank by blasting at targets which hover just out of range before swooping in for the kill. Beware the target snatchers which reduce your score potential.

Win a jackpot, become the Star Commander, but beware the Petals of Doom...all in this month's selection of C16 games.

A lot of flower power is required in *Gremlin Graphics' Petals Of Doom.* Trapped within an eerie space cavern, your only way out is to help the flower plantation reach full growth. But the plant-hating bugs are out to trample your blooms.

Squirm is the delightful name of the *Masteronics* game which has you racing around a hive collecting eggs laid by the Queen Squirm. This will greatly upset all the other squirms, so look out.

And now for something completely different, as they say! *Anirog's Flight Path 737* is 'an advanced pilot trainer'. As the pilot of a high performance jet airliner, you must take off from an airfield surrounded by mountains, climb safely over them and land in the valleys below.

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Get hustling with *Bubble Bus' Hustler.* It's a blend of six pool-type games which can be played by one or two players. You don't have to be a pool fanatic to be able to put the ball into the pocket.

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Commodore 128 Memory Map: (128 Mode)

Without a map it can be difficult to make the most of your 128. Last month we looked at the zero page memory map, here we look at locations $0100 to $0FFF

This is part two of the Commodore 128 Memory map covering memory locations $0100 (256) to $OFFF (4095). Some of you ex C-64 buffs will notice how the map is almost identical in many areas. The cassette buffer has moved to $OBOO (2816). This area is also used as a buffer by the disk auto boot routine. Most of the vectors are in the same locations with the odd funny interspersed. Charget is now located at $0380 (896) and the keyboard buffer has crept up to $034A (842). This lot should keep you busy until next month's memory map.

```
HEX          DECIMAL
0100-010F    256-271 : Filename build area (16 bytes)
0110         272     : Dos loop counter
0111         273     : Dos filename 1 length
0112         274     : Dos disk drive 1
0113         275     : Dos filename 2 length
0114         276     : Dos disk drive 2
0115-0116    277-278 : Dos filename 2 address
0117-0118    279-280 : Bload/Bsave starting address
0119-011A    281-282 : Bload/Bsave ending address
011B         283     : Dos logical address
011C         284     : Dos physical address
011D         285     : Dos secondary address
011E         286     : Dos record length
011F         287     : Dos bank
0120-0121    288-289 : Dos disk I.D.
0122         290     : Dos disk I.D. flag
0123         291     : Pointer to begin no.
0124         292     : Pointer to end no.
0125         293     : Dollar flag
0126         294     : Comma flag
0127         295     : Counter
0128         296     : Sign exponent
0129         297     : Pointer to exponent
012A         298     : Number of digits before decimal point
012B         299     : Justify flag
012C         300     : Number of positions before decimal point (field)
012D         301     : Number of positions after decimal point (field)
012E         302     : +/- flag (field)
012F         303     : Exponent flag (field)
0130         304     : Switch ?
0131         305     : Character counter (field)
0132         306     : Sign number
0133         307     : Blank flag
0134         308     : Pointer to beginning of field
0135         309     : Length of format
0136         310     : Pointer to end of field
0137-01FF    311-511 : System Stack
0200-02A1    512-673 : Input buffer (162 bytes)
02A2-02AE    674-686 : Subroutine. LDA(-),y from any bank
02AF-02BD    687-701 : Subroutine. STA(-),y to any bank
02BE-02CC    702-716 : Subroutine. LDA(-),y to any bank
02CD-02E2    717-738 : Subroutine. JSR xxxx to any bank and back
02E3-02FB    739-763 : Subroutine. JMP xxxx to any bank
02FC-02FD    764-765 : Vector. Additional function routine
02FE-02FF    766-767 : Vector. Function cartridge users
0300-0301    768-769 : Vector. Print BASIC error message
0302-0303    770-771 : Vector. BASIC warm start
0304-0305    772-773 : Vector. Tokenize BASIC text
0306-0307    774-775 : Vector. BASIC text list
0308-0309    776-777 : Vector. BASIC character dispatch
030A-030B    778-779 : Vector. BASIC token evaluation
030C-030D    780-781 : Vector. Escape token crunch
030E-030F    782-783 : ..List..
0310-0311    784-785 : ..And execute..
0312-0313    786-787 : 60 Hz interrupt vector (before jiffy)
```

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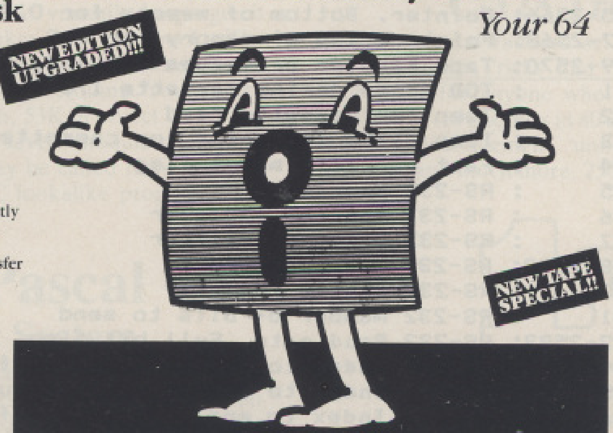
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```
0314-0315  788-789 : IRQ vector
0316-0317  790-791 : Break interrupt vector
0318-0319  792-793 : NMI interrupt vector
031A-031B  794-795 : Kernal OPEN vector
031C-031D  796-797 : Kernal CLOSE vector
031E-031F  798-799 : Kernal CHKIN vector
0320-0321  800-801 : Kernal CHKOUT vector
0322-0323  802-803 : Kernal CLRCHN vector
0324-0325  804-805 : Kernal CHRIN vector
0326-0327  806-807 : Kernal CHROUT vector
0328-0329  808-809 : Kernal STOP vector
032A-032B  810-811 : Kernal GETIN vector
032C-032D  812-813 : Kernal CLALL vector
032E-032F  814-815 : Monitor command vector
0330-0331  816-817 : Kernal LOAD vector
0332-0333  818-819 : Kernal SAVE vector
0334-0335  820-821 : Editor print 'control' indirect
0336-0337  822-823 : Editor print 'shifted' indirect
0338-0339  824-825 : Editor print 'escape' indirect
033A-033B  826-827 : Editor keyscan logic indirect
033C-033D  828-829 : Editor store key indirect
033E-0349  830-841 : Vectors to keyboard matrix decode tables
034A-0353  842-851 : Keyboard buffer (10 bytes)
0354-035D  852-861 : Bitmap of tabs (10 bytes)
035E-0361  862-865 : Bitmap of line wraps
0362-036B  866-875 : Logical file number table
036C-0375  876-885 : Primary device number table
0376-037F  886-895 : Secondary addresses table
0380-039E  896-926 : CHRGET Subroutine to get next byte of BASIC text
0386       902     : CHRGOT Entry to get same byte of text again
039F-03AA  927-938 : Shared rom (0) fetch subroutine
03AB-03B6  939-950 : Shared rom (1) fetch subroutine
03B7-03BF  951-959 : Index1 indirect fetch
03C0-03C8  960-968 : Index2 indirect fetch
03C9-03D1  969-977 : Text pointer index
03D2-03D4  978-980 : Numeric constant for BASIC, downloaded from rom
03D5       981     : Context for SYS,POKE,PEEK. Set by BANK command
03D6-03D9  982-985 : Temp for instr
03DA       986     : Bank pointer for string
03DB-03DE  987-990 : Temp work space for SSHAPE
03DF       991     : FAC#1 overflow digit
03E0-03E1  992-993 : Temp for SPRSAV
03E2-03FF  994-1023: Packed foreground/background colour nybbles
03E3-03FF  995-1023: Packed foreground/multicolour 1 colour nybbles
0400-07E7 1024-2023: Vic 40 column text screen
0800-09FF 1048-2559: BASIC run time stack (512 bytes)
0A00-0A01 2560-2561: Vector ro restart system (usually BASIC warm start)
0A02      2562     : Kernal warm/cold initialization status byte
0A03      2563     : PAL/NTSC system flag
0A04      2564     : NMI status flag
0A05-0A06 2565-2566: Pointer. Bottom of memory for O.S.
0A07-0A08 2567-2568: Pointer. Top of memory for O.S.
0A09-0A0A 2569-2570: Tape handler preserves IRQ indirect here
0A0B      2571     : TOD sense during cassette I/O
0A0C      2572     : Temp for cassette read
0A0D      2573     : Temp D1IRQ indicator for cassette read
0A0E      2574     : Fast serial timeout flag
0A0F      2575     : RS-232 Enables
0A10      2576     : RS-232 Control register
0A11      2577     : RS-232 Command register
0A12-0A13 2578-2579: RS-232 User baud rate
0A14      2580     : RS-232 Status register
0A15      2581     : RS-232 Number of bits to send
0A16-0A17 2582-2583: RS-232 Baud rate. Full bit time
0A18      2584     : RS-232 Index to end of input buffer
0A19      2585     : RS-232 Index to start of input buffer
0A1A      2586     : RS-232 Index to end of output buffer
0A1B      2587     : RS-232 Index to start of output buffer
0A1C      2588     : Fast serial internal/external flag
0A1D-0A1F 2589-2591: Decrementing jiffy register
0A20      2592     : Keyboard buffer size
0A21      2593     : Control 's' flag  (home cursor)
0A22      2594     : Enable key repeats. 128=all, 64=none
0A23      2595     : Delay between key repeats
0A24      2596     : Delay before a key starts repeating
0A25      2597     : Delay between C= and shift toggles
```

```
0A26      2598      : Vic cursor mode (blinking, solid)
0A27      2599      : Vic cursor disable
0A28      2600      : Vic cursor blink counter
0A29      2601      : Vic cursor character before blink
0A2A      2602      : Vic cursor colour before blink
0A2B      2603      : VDC cursor mode (when enabled)
0A2C      2004      : Vic text screen/character base pointer
0A2D      2605      : Vic bit-map base pointer
0A2E      2606      : VDC text screen base
0A2F      2607      : VDC attribute base
0A30      2608      : Temp pointer to last line for LOOP4
0A31-0A32 2609-2610: Temp for 80 column routines
0A33      2611      : VDC cursor colour before blink
0A34      2612      : Vic split screen raster value
0A35      2613      : Save x reg during bank operations
0A36      2614      : Counter for pal systems
0A37      2615      : Save system speed during tape & serial bus operations
0A38      2616      : Save sprite enables "    "      "        "
0A39      2617      : Save blanking status during tape operations
0A3A      2618      : Flag set by user wanting full control of vic
0A3B      2619      : Hi byte of secondary address of vic screen
0A3C-0A3D 2620-2621: 8563 block fill ?
0A3E-0A3F 2622-2623: ?
0A40-0A47 2624-2631: Screen variables when 40/80 mode changes
0A80-0ABF 2632-2751: Monitor workspace
0AC0      2752      : Current function key rom bank
0AC1-0AC4 2753-2756: Physical address table (I.D.'s of logged in cards) ?
0AC5      2757      : Reserved for foreign screen editors
0AC6-0AFF 2758-2815: Reserved for system
0B00-0BC0 2816-3008: Cassette buffer
0B00-0BFF 2816-3071: Used as a buffer for the disk auto boot
0C00-0CFF 3072-3327: RS-232 Input buffer
0D00-0DFF 3328-3583: RS-232 Output buffer
0E00-0FFF 3584-4095: Sprite definition area (512 bytes)
```

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Graphics on the 128

A selection of long and short routines showing some of the graphics possible in 128 basic, is provided by John Picking.

CLOCK draws a grandfather type clock face on the screen and keeps time using the internal clock. The starting time is entered in the standard HHMMSS format, eg 100555 = 10.05 and 55 seconds.

```
CLOCK
READY.
10 CLR : DEF FNA(X)=X*/180)
20 COLOR 0,1:COLOR4,1:COLOR1,2
30 GRAPHIC0,1 : INPUT "TIME ";TI$
40 GRAPHIC1,1
50 SCALE 0
60 GOSUB 280
70 S=VAL(RIGHT$(TI$,2)):M=VAL(MID$(TI$,3,2)):H=VAL(LEFT$(TI$,2))
80 C=H*30+(INT(M/12)*6)
90 DO : LOOP WHILE TI$=X$
100 X$=TI$ :WIDTH2
110 DRAW 0,160,100           TO 50;S*6
120 S=S+1  : IF S=60 THEN S=0 :GOSUB200
130 WIDTH1:  DRAW 1,160,100 TO 50;(S*6)
140 GOSUB 160
150 GOTO 90
160 REM MINUTE & HOUR HAND
170 A=M*6
180 WIDTH2 : DRAW 1,160,100 TO 55;A
190 DRAW 1,160,100 TO 40;C :RETURN
200 WIDTH2:   DRAW 0,160,100 TO 55;A
210 M=M+1
220 IF M=60 THEN M=0 :H=H+1:IFH=12 THEN H=0
230 IF M/12=INT(M/12) THEN BEGIN
240 IFC>0THEN DRAW 0,160,100 TO 40;C-1
250 DRAW 0,160,100 TO 40;C
260 DRAW 0,160,100 TO 40;C+1 : C=C+6:BEND
270 GOTO 160
280 DRAW 1,17,0 TO 17,200 : DRAW 1,306,0TO306,200 : WIDTH1
290 CIRCLE 1,160,100,90,90
300 CIRCLE 1,160,100,67
310 BOX 1,65,5,255,195
320 BOX 1,63,3,257,197
330 DRAW 1,120,10TO70,10TO70,60:CIRCLE1,120,60,50,50,270,360:PAINT1,72,12
340 DRAW 1,200,10TO250,10TO250,60:CIRCLE1,200,60,50,50,0,90:PAINT1,248,12
350 DRAW 1,120,190TO70,190TO70,140:CIRCLE1,120,140,50,50,180,270:PAINT1,72,188
360 DRAW 1,200,190TO250,190TO250,140:CIRCLE1,200,140,50,50,90,180:PAINT1,248,188
370 COLOR1,10:CIRCLE 1,160,100,4 : PAINT1,160,100:COLOR1,2
380 SSHAPE A$,152,92,175,115
390 SPRSAV A$,1 : SPRITE 1,1,2  : MOVSPR1,175,142
400 PAINT 1,160,15
410 CIRCLE 0,160,100,88,88
420 COLOR1,10:PAINT1,40,0,1
430 DRAW 0,37,0TO37,200 :DRAW 0,286,0TO286,200        :COLOR1,2
440 I=30 :X=160 : Y=100 : WIDTH 2
450 GOSUB 500
460 FOR I=0 TO 360 STEP 6 : WIDTH 1
470 IF (I/30)=INT(I/30) THEN DRAW 0,160,100 TO 60;I : DRAW 1,RDOT(0),RDOT(1) TO
8;I : GOTO 490
480 DRAW 0,160,100 TO 64;I : DRAW 1,RDOT(0),RDOT(1) TO 4;I
490 NEXT : WIDTH 1 :RETURN
500 REM I
510 I=30
520 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
530 DRAW 0,RDOT(0),RDOT(1) TO 3;I+270 TO 7;I+90 TO 3;I+270 TO 11;I TO 3;I+270 TO
 7;I+90
540 REM II
550 I=60
560 LOCATE 160+(73*SIN(FNA(I))),100-(73*COS(FNA(I)))
570 DRAWO,RDOT(0),RDOT(1) TO 5;I+270 TO 10;I+90 TO 3;I+270 TO 11;I TO 3;I+90 TO
10;I+270 TO 3;I+90 TO 11;I+180
580 REM III
590 I=90
600 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
```

```
610 DRAWO,RDOT(0),RDOT(1) TO 6;I+270 TO 12;I+90 TO 3;I+270 TO 11;I TO 3;I+90 TO
12;I+270 TO 3;I+90 TO 11;I+180 TO 3;I+90 TO 11;I
620 REM IV
630 I=120
640 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
650 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 10;I+270 TO2;I+90 TO 11;I TO 2;I+270 TO 1
0;I+90 TO 6;I+270 TO 11;I+165 TO 11;I+15
660 REM V
670 I=150
680 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
690 DRAWO,RDOT(0),RDOT(1) TO 3;I+90 TO 7;I+270 TO 3;I+90 TO 12;I-15 TO 1;I+270 T
O 8;I+90 TO 1;I+270 TO 11;I+195
700 REM VI
710 I=180
720 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
730 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 11;I+270 TO 4;I+90 TO 12;I-15 TO 1;I+270
TO 10;I+90 TO 3;I+270 TO 12;I+195 TO 5;I+90 TO 11;I
740 REM VII
750 I=210
760 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
770 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 11;I+270 TO 4;I+90 TO 12;I-15 TO 1;I+270
TO 10;I+90 TO 3;I+270 TO 12;I+195 TO 5;I+90 TO 12;I
780 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 2;I+270 TO 12;I+180 TO 2;I+90 TO 5;I+270
790 REM VIII
800 I=240
810 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
820 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 11;I+270 TO 4;I+90 TO 12;I-15 TO 1;I+270
TO 10;I+90 TO 3;I+270 TO 12;I+195 TO 5;I+90 TO 12;I
830 DRAWO,RDOT(0),RDOT(1) TO 5;I+90 TO 2;I-90  TO 12;I+180 TO 5;I+90 TO 2;I-90
TO 12;I TO 2;I+90 TO 3;I-90
840 REM IX
850 I=270
860 LOCATE 160+(73*SIN(FNA(I))),100-(73*COS(FNA(I)))
870 DRAWO,RDOT(0),RDOT(1) TO 4;I-90 TO 2;I+90 TO 11;I TO 2;I-90 TO 10;I+90 TO 2;
I-90 TO 12;I+200 TO 6;I+90 TO 2;I-90 TO 12;I-20
880 REM X
890 I=300
900 LOCATE 160+(73*SIN(FNA(I))),100-(73*COS(FNA(I)))
910 DRAWO,RDOT(0),RDOT(1) TO 1;I+90 TO 8;I-90 TO 5;I+90 TO12;I-20 TO 2;I-90 TO 8
;I+90 TO 2;I-90 TO 12;I+200
920 REM XI
930 I=330
940 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
950 DRAWO,RDOT(0),RDOT(1) TO 4;I+90 TO 2;I-90 TO 11;I TO 2;I+90 TO 9;I-90 TO 0;I
+90 TO 12;I+160 TO 4;I-90 TO 12;I+20
960 REM XII
970 I= 360
980 LOCATE 160+(72*SIN(FNA(I))),100-(72*COS(FNA(I)))
```

CUPS and **GLOBE** are short programs which create hi-res graphics displays. They can run in FAST mode if wanted.

```
CUPS

READY.

3 COLORO,1:COLOR4,1:GRAPHICO,1
5 INPUT "FAST OR SLOW ";A$
6 IF A$="F" THEN PRINT"PLEASE WAIT...":
   SLEEP2:FAST
10 GRAPHIC1,1
20 COLOR1,16
30 FOR I=40 TO 100 STEP10
40 CIRCLE 1,160,120,100,I,90,270
50 NEXT
60 CIRCLE 1,160,120,100,30,35,325
80 FOR I=00 TO 100 STEP10
90 CIRCLE 1,160,70,100,I,270,90
100 NEXT
101 CIRCLE 1,160,70,100,10,90,270:CIRCLE1,
    160,70,100,20,90,270
110 CIRCLE 1,160,70,100,30
120 PAINT 1,160,120
130 WIDTH2 : BOX1,0,0,319,199
140 WIDTH1:DRAW1,0,110TO319,110
150 PAINT1,10,115:PAINT1,310,115
160 CIRCLE 0,160,120,100,30,35,325
170 CHAR1,1,24,"HIT A KEY",1
180 SLOW
10000 GETKEY A$
10010 GRAPHICO:END
READY.
```

```
GLOBE

READY.

5 COLORO,1:COLOR4,1:GRAPHICO,1
6 INPUT "FAST OR SLOW ";A$
7 IF A$="F" THEN PRINT"PLEASE WAIT...":
   SLEEP2:FAST
10 GRAPHIC1,1
20 COLOR1,16
30 FOR I=90 TO 0 STEP -10 :
   R=INT(90*SIN(I*/180)))
40 CIRCLE 1,160,100,90,R
50 CIRCLE 1,160,100,R,90
60 NEXT
70 WIDTH2 : BOX1,0,0,319,199 : WIDTH1
90 CHAR1,1,23,"HIT A KEY",0
100 SLOW
10000 GETKEY A$
10010 GRAPHICO:END

READY.
```

Program Cruncher

CRUNCH is a machine code program by Barry Parkes which removes REMs and spaces to minimise program storage space and optimise speed of execution

If your programming style is anything like mine (learnt the hard way!) you like to produce programs which are well commented and easy to follow with the listing nicely spaced into logical sections. This is an admirable approach but, unfortunately, if the program is written in BASIC every REM statement and space character incurs a speed and size penalty.

How to use Crunch

STEP 1 Write and debug your BASIC program in the usual way including as many REMs and spaces as you like.
STEP 2. LOAD "CRUNCHLOAD", 8 from disk or cassette (omit ,8) in the usual way.
STEP 3. RUN the program to deposit the CRUNCH Machine Code into upper memory.
STEP 4. When READY, type NEW and LOAD your de-bugged BASIC program.
STEP 5. Type SYS 49152 and wait!
STEP 6. On completion the screen will display CLR and READY. You can then SAVE the "Crunched" program to tape or disk in the usual way.

Before using CRUNCH you will, of course, need to type in the loader and SAVE it. The loader is supplied as LISTING 1. The program is simple, but there is a lot of it! Anybody who doesn't want the tedium of typing all that DATA in, is welcome to write to me via CCI enclosing a disk or cassette. I will then supply a copy for a nominal fee.

How it Works

The CBM 64 stores BASIC programs in a compacted form using "Tokens" for keyboards such as PRINT, REM, DATA, GOTO, etc. Each line of BASIC starts with a two-byte link address (which points to the next line of code) then a two-byte line number followed by the rest of the text. Each line is terminated by an additional pair of zero bytes (where the next link address would be).

The Machine Code program searches the BASIC program for spaces, REM's and " symbols. Every time the program finds a space it moves the whole of the remainder of the program down one byte thus deleting the space character. As it is obviously undesirable to delete spaces which are between " marks (they are probably part of your screen text!) these are left intact.

Dealing with REM's is rather more difficult as they can be on lines on their own, at the ends of lines using a : separator or even at the start of lines terminated by a :. All these situations are dealt with by the program using the same technique (ie memory movement down by one location) to delete REM tokens and the following characters. If a REM occurs on a line on its own, the whole line is deleted. Any blank lines are deleted as are extra : separators.

When the program has finished processing the text, the BASIC variables pointer (VARTAB) is set to reflect the increased length of the program. The BASIC program lines are re-chained (i.e. the link addresses are re-calculated) by calling a subroutine which is resident in the BASIC ROM.

As the program deletes characters by moving the whole of the remaining BASIC by one location, it can obviously take some time to process a large program. As an example, processing an 8K program took approximately twenty minutes and was reduced to 5K.

Experiments which I have performed on my own programs indicate that savings on storage space of up to about fifty percent can be made, and that execution times are improved significantly especially when REMs etc are removed from FOR loops which are repeated many times.

LISTING 2 is provided for those people who have their own Assembler development facilities or who are just interested in the detail of the program.

Hints

1. When writing your BASIC program, remember not to GOTO REM statements as these will be deleted by CRUNCH. Using GOTO REMs is bad practice anyway.
2. CRUNCH does not pack multiple statements onto lines as it cannot "know" the logic of your program. To minimise execution time, you should put more than one statement on a line where possible, especially in FOR loops. CRUNCH will handle these satisfactorily.
3. Only the first two characters of a variable name are recognised by BASIC so that much space (and time) can be saved by using names of minimum length.

```
100 REM ********************************
110 REM *                              *
120 REM *         LISTING  1           *
130 REM *                              *
140 REM *    *** CRUNCH  LOAD ***      *
150 REM *                              *
160 REM *    BARRY PARKES  JAN 86      *
170 REM *                              *
180 REM ********************************
190 REM
200 REM THIS PROGRAM LOADS THE "CRUNCH"
210 REM MACHINE CODE INTO RAM.
220 REM
230 PRINT "[illegible]"
240 PRINT SPC(3) "LOADING MACHINE CODE": PRINT
250 MC=49152: RL=0: LN=500
260 SC=0: FOR I=0 TO 7: READ D
270 IF D<0 GOTO 340
280 IF D>255 GOTO 330
290 POKE MC+RL,D: SC=SC+D: RL=RL+1: NEXT I
300 READ D: IF D<0 GOTO 340
310 IF SC=D THEN LN=LN+10: GOTO 260
320 PRINT "SUMCHECK ";
```

```
330 PRINT "ERROR IN LINE";LN: GOTO 370
340 READ D: IF SC<>D GOTO 320
350 PRINT: PRINT SPC(8) "LOADED": PRINT
360 PRINT "TO USE, TYPE: SYS 49152": PRINT
370 END
380 REM
390 REM MACHINE CODE DATA FOLLOWS
400 REM
500 DATA 24,165,43,105,255,133,253,165,1143
510 DATA 44,105,255,133,254,160,0,162,1113
520 DATA 0,32,192,192,32,192,192,32,864
530 DATA 192,192,32,192,192,24,165,253,1242
540 DATA 105,1,141,11,193,165,254,105,975
550 DATA 0,141,12,193,24,32,192,192,786
560 DATA 240,48,201,143,240,28,201,32,1133
570 DATA 240,32,201,34,208,238,138,240,1331
580 DATA 4,162,0,240,231,162,1,208,1008
590 DATA 227,32,192,192,240,20,201,58,1162
600 DATA 240,11,32,201,192,144,242,76,1138
610 DATA 13,192,138,208,207,32,201,192,1183
620 DATA 144,202,165,253,205,11,193,208,1381
630 DATA 24,165,254,205,12,193,208,17,1078
640 DATA 32,201,192,32,201,192,32,201,1083
650 DATA 192,32,201,192,32,201,192,144,1186
660 DATA 20,32,252,192,177,253,201,58,1185
670 DATA 208,8,32,201,192,32,192,192,1057
680 DATA 144,208,32,192,192,160,1,177,1106
690 DATA 253,208,188,200,177,253,208,183,1670
700 DATA 24,165,253,105,3,133,45,165,893
710 DATA 254,105,0,133,46,32,51,165,786
720 DATA 160,0,185,13,193,153,119,2,825
730 DATA 200,192,4,208,245,132,198,96,1275
740 DATA 230,253,208,2,230,254,177,253,1607
750 DATA 96,24,165,45,229,253,133,251,1196
760 DATA 165,46,229,254,133,252,165,253,1497
770 DATA 133,34,165,254,133,35,160,1,915
780 DATA 177,34,136,145,34,230,34,208,998
790 DATA 2,230,35,56,165,251,233,1,973
800 DATA 133,251,176,234,165,252,233,0,1444
810 DATA 133,252,176,226,56,165,253,233,1494
820 DATA 1,133,253,165,254,233,0,133,1172
830 DATA 254,24,96,0,0,67,76,82,599
840 DATA 13,-1,13
READY.
```

```
0000                ;        LISTING 2
0000                ;
0000                ;      *** CRUNCH ***
0000                ;
0000                ;  BARRY PARKES JAN '86
0000                ;
0000                ; CALL THIS ROUTINE USING SYS 49152
0000                ; TO REMOVE REMS AND EXTRANEOUS SPACES
0000                ; FROM A BASIC PROGRAM.
0000                ;
0000                       TXTTAB=$2B      ;START OF BASIC TEXT
0000                       VARTAB=$2D      ;  "   "  VARIABLES
0000                       KEYD=$277       ;KEYBOARD BUFFER
0000                       NDX=$C6         ;NO OF KEYBOARD CHARS
0000                ;
0000                       BTCNT=$FB       ;BYTE COUNT  FOR MOVE
0000                       TXTPTR=$FD      ;BASIC TEXT POINTER
0000                       INDEX=$22       ; "   POINTER "   "
0000                ;
0000                       RCHAIN=$A533    ;RE-CHAIN BASIC LINES
0000                ;
0000                ; ENTRY POINT
0000                ;
0000                       *=$C000
C000                ;
C000  18            CRUNCH CLC             ;INITIALISE TEXT POINTER
C001  A5 2B                LDA TXTTAB      ;START OF BASIC
C003  69 FF                ADC #$FF        ;MINUS 1
C005  85 FD                STA TXTPTR
C007  A5 2C                LDA TXTTAB+1
C009  69 FF                ADC #$FF
C00B  85 FE                STA TXTPTR+1
C00D                ;
C00D  A0 00         LINE   LDY #0          ;ENSURE Y REG CLEAR
C00F  A2 00                LDX #0          ;RESET QUOTE FLAG (X REG)
```

```
C011  20 C0 C0         JSR INCBPT     ;SKIP LINK ADDRESS
C014  20 C0 C0         JSR INCBPT
C017  20 C0 C0         JSR INCBPT     ;SKIP LINE NO
C01A  20 C0 C0         JSR INCBPT
C01D  18               CLC            ;NOTE START OF LINE ADDRESS
C01E  A5 FD            LDA TXTPTR
C020  69 01            ADC #1
C022  8D 0B C1         STA STRLN
C025  A5 FE            LDA TXTPTR+1
C027  69 00            ADC #0
C029  8D 0C C1         STA STRLN+1
C02C           ;
C02C  18       GCHR    CLC            ;INC POINTER AND GET CHAR
C02D  20 C0 C0         JSR INCBPT
C030  F0 30            BEQ EOL        ;END OF LINE ?
C032  C9 8F            CMP #$8F       ;NO - REM TOKEN ?
C034  F0 1C            BEQ RTOKN
C036  C9 20            CMP #$20       ;NO - IS IT SPACE ?
C038  F0 20            BEQ SPC
C03A  C9 22            CMP #$22       ;NO - IS IT " ?
C03C  D0 EE            BNE GCHR
C03E  8A               TXA            ;YES - QUOTE MODE ?
C03F  F0 04            BEQ SFG
C041  A2 00            LDX #0         ;YES - RESET FLAG
C043  F0 E7            BEQ GCHR       ;ALWAYS
C045  A2 01    SFG     LDX #1         ;NO - SET FLAG
C047  D0 E3            BNE GCHR       ;ALWAYS
C049           ;
C049           ;NEXT SECTION DEALS WITH REMS
C049           ;
C049  20 C0 C0 RMCHR   JSR INCBPT     ;GET NEXT CHARACTER
C04C  F0 14            BEQ EOL        ;END OF LINE ?
C04E  C9 3A            CMP #$3A       ;NO - COLON ?
C050  F0 0B            BEQ MOVDWN
C052  20 C9 C0 RTOKN   JSR MOVMEM     ;NO - MOVE TEXT DOWN ONE
C055  90 F2            BCC RMCHR      ;ALWAYS
C057           ;
C057  4C 0D C0 LINELK  JMP LINE       ;LINK TO LINE
C05A           ;
C05A  8A       SPC     TXA            ;QUOTE MODE ?
C05B  D0 CF            BNE GCHR       ;YES - ALLOW SPACE TO STAY
C05D  20 C9 C0 MOVDWN  JSR MOVMEM     ;NO - DELETE IT
C060  90 CA            BCC GCHR       ;ALWAYS
C062           ;
C062  A5 FD    EOL     LDA TXTPTR     ;BLANK LINE ?
C064  CD 0B C1         CMP STRLN
C067  D0 18            BNE NBLNK
C069  A5 FE            LDA TXTPTR+1
C06B  CD 0C C1         CMP STRLN+1
C06E  D0 11            BNE NBLNK
C070  20 C9 C0         JSR MOVMEM     ;YES - DELETE IT
C073  20 C9 C0         JSR MOVMEM
C076  20 C9 C0         JSR MOVMEM
C079  20 C9 C0         JSR MOVMEM
C07C  20 C9 C0         JSR MOVMEM
C07F  90 14            BCC TSTEND     ;ALWAYS
C081           ;
C081  20 FC C0 NBLNK   JSR DPT        ;DECREMENT TEXT POINTER
C084  B1 FD            LDA (TXTPTR),Y ;WAS LAST CHAR A COLON ?
C086  C9 3A            CMP #$3A
C088  D0 08            BNE NOEXS      ;NO
C08A  20 C9 C0         JSR MOVMEM     ;YES - DELETE IT
C08D  20 C0 C0         JSR INCBPT     ;RE-ALIGN TEXT POINTER
C090  90 D0            BCC EOL        ;CHECK FOR MORE
C092  20 C0 C0 NOEXS   JSR INCBPT     ;RE-ALIGN TEXT POINTER
C095           ;
C095  A0 01    TSTEND  LDY #1         ;TEST FOR PROGRAM END
C097  B1 FD            LDA (TXTPTR),Y
C099  D0 BC            BNE LINELK
C09B  C8               INY
C09C  B1 FD            LDA (TXTPTR),Y
C09E  D0 B7            BNE LINELK
C0A0  18               CLC            ;IS END
C0A1  A5 FD            LDA TXTPTR     ;RE-SET VARIABLES POINTER
C0A3  69 03            ADC #3
C0A5  85 2D            STA VARTAB
C0A7  A5 FE            LDA TXTPTR+1
C0A9  69 00            ADC #0
C0AB  85 2E            STA VARTAB+1
C0AD  20 33 A5         JSR RCHAIN     ;RE-CHAIN BASIC LINES
C0B0  A0 00            LDY #0         ;TRANFER CLR COMMAND
C0B2  B9 0D C1 MSGLP   LDA MSG,Y      ;TO KEYBOARD BUFFER
```

```
C0B5  99 77 02            STA KEYD,Y
C0B8  C8                  INY
C0B9  C0 04               CPY #4
C0BB  D0 F5               BNE MSGLP
C0BD  84 C6               STY NDX         ;SET CHARACTER COUNT
C0BF  60                  RTS             ;EXIT TO BASIC
C0C0            ;
C0C0            ;
C0C0            ; SUBROUTINE TO INCREMENT TEXT POINTER
C0C0            ; AND GET NEXT CHARACTER
C0C0            ;
C0C0  E6 FD     INCBPT    INC TXTPTR      ;INCREMENT POINTER
C0C2  D0 02               BNE OVFL
C0C4  E6 FE               INC TXTPTR+1
C0C6  B1 FD     OVFL      LDA (TXTPTR),Y  ;GET CHARACTER
C0C8  60                  RTS             ;RETURN
C0C9            ;
C0C9            ;
C0C9            ; SUBROUTINE TO MOVE WHOLE BASIC PROGRAM DOWN
C0C9            ; BY ONE LOCATION. ALSO DECREMENTS TEXT POINTER
C0C9            ; TO RE-ALIGN IT.
C0C9            ;
C0C9  18        MOVMEM    CLC             ;SET NO OF BYTES
C0CA  A5 2D               LDA VARTAB
C0CC  E5 FD               SBC TXTPTR
C0CE  85 FB               STA BTCNT
C0D0  A5 2E               LDA VARTAB+1
C0D2  E5 FE               SBC TXTPTR+1
C0D4  85 FC               STA BTCNT+1
C0D6  A5 FD               LDA TXTPTR      ;SET START ADDRESS
C0D8  85 22               STA INDEX
C0DA  A5 FE               LDA TXTPTR+1
C0DC  85 23               STA INDEX+1
C0DE            ;
C0DE  A0 01     MOVLP     LDY #1          ;MOVE BYTE DOWN
C0E0  B1 22               LDA (INDEX),Y
C0E2  88                  DEY
C0E3  91 22               STA (INDEX),Y
C0E5  E6 22               INC INDEX       ;INCREMENT POINTER
C0E7  D0 02               BNE OFL
C0E9  E6 23               INC INDEX+1
C0EB  38        OFL       SEC             ;DECREMENT AND TEST COUNT
C0EC  A5 FB               LDA BTCNT
C0EE  E9 01               SBC #1
C0F0  85 FB               STA BTCNT
C0F2  B0 EA               BCS MOVLP
C0F4  A5 FC               LDA BTCNT+1
C0F6  E9 00               SBC #0
C0F8  85 FC               STA BTCNT+1
C0FA  B0 E2               BCS MOVLP
C0FC            ;
C0FC  38        DPT       SEC             ;RE-ALIGN TEXT POINTER
C0FD  A5 FD               LDA TXTPTR
C0FF  E9 01               SBC #1
C101  85 FD               STA TXTPTR
C103  A5 FE               LDA TXTPTR+1
C105  E9 00               SBC #0
C107  85 FE               STA TXTPTR+1
C109  18                  CLC
C10A  60                  RTS             ;RETURN
C10B            ;
C10B  00        STRLN     .BYTE 0         ;START OF LINE POINTER
C10C  00                  .BYTE 0
C10D            ;
C10D  43 4C 52  MSG       .BYTE 'CLR'     ;MESSAGE FOR KEYBOARD BUFFER
C110  0D                  .BYTE $0D       ;RETURN CHARACTER
C111            ;
C111                      .END

ERRORS = 00000
SYMBOL TABLE

SYMBOL VALUE
 BTCNT    00FB   CRUNCH  C000   DPT     C0FC   EOL     C062
 GCHR     C02C   INCBPT  C0C0   INDEX   0022   KEYD    0277
 LINE     C00D   LINELK  C057   MOVDWN  C05D   MOVLP   C0DE
 MOVMEM   C0C9   MSG     C10D   MSGLP   C0B2   NBLNK   C081
 NDX      00C6   NOEXS   C092   OFL     C0EB   OVFL    C0C6
 RCHAIN   A533   RMCHR   C049   RTOKN   C052   SFG     C045
 SPC      C05A   STRLN   C10B   TSTEND  C095   TXTPTR  00FD
 TXTTAB   002B   VARTAB  002D

END OF ASSEMBLY
```

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Superior 128D

Commodore's 128D with integral drive is found to be a machine of 'substance and quality'.

I first came across the C128D at the Which Computer Show at Birmingham NEC during early January and at first glance had taken it for the AMIGA. The processor box is much the same size and appears to be modelled on the AMIGA. This box houses the 1571 disk drive, main pcb and power supply and is sufficient in strength to support a colour monitor.

The front of the machine has just two led's, a prominent power indicator is coloured red, whilst the disk drive indicator is green which also functions as the drive error light. The left-hand side sports a substantial carrying handle which seems unnecessary since the unit is light and small enough to be carried underarm without discomfort. The rear of the machine contains the sockets for 240 volt power supply and the usual assortment of standard Commodore input/output sockets. There are also two large prongs looking like flattened bull horns which at first I took to be some kind of arrangement for looping cable around or hanging the machine up by! It was only when I plugged in my Commodore modem to check out this end of the machine's abilities that I realised their true purpose. The expansion and user ports are quite high off the base and heavy attachments such as the modem would be supported only by their pins and boards, not good engineering. These solid 'bull horns' solve this in an elegant manner by offering the required support, a very neat arrangement. The right hand side of the processor box has the two usual joystick ports, a 25 pin D-socket for the keyboard connector and two reset buttons. One is the main reset, whilst the other is for the drive only. This latter one is slightly recessed and needs something the diameter of a knitting needle in order to access it.

The keyboard assembly is identical in layout to the C128 although the keys appear to have a more polished feel to them. There are also two legs to the base of the keyboard allowing the user to have it tilted if required, again demonstrating the keen atttention paid to design detail by Commodore.

"Substance and quality"

I found using the C128D to be a different machine to it's brother the C128, altogether a machine of substance and quality, far removed from it's home computer origins. There is no doubt in my mind that is entirely due to the 1571 drive – operating the C128/1541 configuration before was like trying to swim fully-clothed, exhausting.

The 1571 drive in GCR format mode is, from a hardware point of view, not very far removed from the 1541. It gains the additional capacity by reading and writing an additonal 35 tracks on the other side of the disk. I found that all of my single-sided disks would accept this format, which released a not inconsiderable quantity of disks for re-use. It was necessary to ensure that the disks to be formatted were completely bare, ie 'wiped' by magnet otherwise the 1571 would, on detecting a 1541 formatted disk would understandably assume, that you wanted it to behave as a 1541. It gains the fast operating speed from the so-called 'burst serial mode' which employs an unused SERVICE REQUEST line on the Commodore serial bus. This line is controlled by hardware and does not affect the data being read, although this mode is only operative during the read and not the

"Decent capacity"

In MFM mode, the 1571 gives access to CP/M 80 and the C128D is supplied with Version 3.0 of CP/M or CP/M PLUS to give it the correct title. The system disk has been well laundered by either Commodore or Digital Research to remove the best utilities and the lack of an assembler I found not very amusing. However, if you found that burst mode GCR was fast, then MFM mode is even faster and the CP/M PLUS disk loads very fast indeed. It is this feature that really makes the C128D into a respectable CP/M machine. Not only does the drive have multi-format capabilities, which are programmable, it aslo has a decent (by CP/M standards) capacity. The disk drive engineering team at Commodore may have kept us waiting for an excessive amount of time, but they have vindicated themselves by providing an advanced drive unit.

The documentation supplied with the C128D I received consisted of three manuals, two of which were specific to the C128 although the differences to an existing Commodore user would be apparent. The third manual related to the 1571 drive and once more the same situation applied for new users, that is new to personal computers, a short introductory text wouldn't go amiss. The package also included the 1571demo disk with the praised 'DOS Shell' program which made life simple for file transfer, although I would have liked to have seen a Centronics printer driver from the User Port in with this.

At the time of writing I have not received the Commodore 1901 monochrome monitor although I found no problems using my Philips 7502 green monitor for 40 or 80 column display. The only hiccup that did appear in this direction was obtaining the necessary 9 pin D-plug, most shops could only offer the female sockets as used in joysticks, however Tandy were successful as usual though at a price.

"Greater perceived quality"

The C128D is targetted at the small business and serious home user market, so let's examine each from the users point of view. The small business market is potentially very profitable and largely unexploited. The direction competition here stems from the Amstrad PCW256 and 6128. Amstrad have a tradition of supplying consumer electronic products at a low price. Whilst by and large they do the job, the price reflects the quality and although the specifications may read impressive, in use it is a different story. The keyboard of the PCW256 is cramped and feels cheap, the disk capacity for serious applications is too small and the disk size is not an industry standard. Commodore themselves learned the hard way about industry standards in terms of disk formats thus AMIGA and the 1571 drive are open in this context.

For the serious home user the C128D has the benefits of an established software base in the C64 and a growing amount of C128 software.

Any complaints about the C128D? Well, just minor ones which hopefully will be attended to when revision time comes around. I would have liked to have seen the facility to store the keyboard underneath the processor box and thus save space. Also, a drive device number switch made available externally would be useful and convenient for those of us retaining 1541's. Finally, the RGBI port does not have an audio output, this can only be obtained from the 40 column port meaning an additional cable running to the monitor. Two of the pins on the RGBI socket are earth pins thus one of these is surplus to requirements, the extraneous one should be connected and used for audio output.

In summary the C128D proves once more that if Commodore try hard enough they can come up with the products that we want. This machine will be a success, not because it has BASIC 7.0 or CP/M PLUS or C64 compatibilities since none of these elements guarantee anything, what it does have is that indefinable charisma of superiority in looks and feel. These are the determining factors for first-time buyers, for existing Commodore users here's a machine that we are familiar with but are not now afraid to admit to others that we own.

Bill Donald

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Turbo Nibbler	A big surprise! Now you can copy different speeds on a single track.
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Turbo Nibbler	By far, one of the best copy programs, without using any hardware. With a complete new copy concept, copies errors 20,21,22,23,24,27,29 also killertracks, error blocks, wrong ID and space behind the data blocks.
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Turbo Nibbler	Copies also non 1541 formats.
Turbo Nibbler	Copies up to 41 tracks.
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Turbo Nibbler	Turbo Nibbler Can be used with a Commodore 64 and a 1541 disk drive.

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THE UTILITY SPECIALISTS

FREEZE FRAME

THE NEW GENERATION OF BACKUP METHODS HAS ARRIVED

"Freeze Frame" is the product that '64 owners have been waiting for. At the touch of a switch "Freeze Frame" will take control of your computer and freeze the program in memory, allowing you to **SAVE it to tape or disc**. The uses are endless, but typical applications are ...

TAPE TO DISC: Use "Freeze Frame" to freeze a memory resident program and transfer it to disc **regardless of the type of loading technique used**. (Disc save incorporates a fast loading system.)

DISC TO TAPE: Memory resident disc programs can be backed up onto tape. (Saved at turbo speed.)

DISC TO DISC: It is possible to make a self contained back up of disc based programs that will both **load at high speed** and **allow the rest of the disc to be used as normal**.

TAPE TO TAPE: Tape back ups can be made at turbo speed with just one tape deck.

CUSTOMISE PROGRAM: The process can normally be actuated at **any stage** of a program, this means you can SAVE a program at a critical stage and restart at that point in the future!! If you like putting "POKES" into programs for extra lives etc. you can save a version with these active.

In fact "Freeze Frame" is the **ultimate utility**, it works on the program in memory and allows you to make a back up of that program onto tape or disc. The beauty being that the saved version is fast loading and in the case of disc backups no longer has drive damaging DOS errors. The process is **completely automatic** no knowledge of BASIC or machine language is required, just follow the prompts and the simple instructions for **amazing results**.

"Freeze Frame" is a hardware "device" that plugs into the cartridge port of the '64. It does **NOT** dump the entire contents of memory, just the **working program and parameters**. Programs converted run **independently** of the hardware. It is also compatible with the "128" in '64 mode and 1570 disc drive. In tests "Freeze Frame" has proved 100% successful with software tested.

ONLY £39.95

WARNING: Don't be misled by other adverts, if you want to transfer turbo load programs to disc, software only utilities are inadequate. They suffer from a variety of drawbacks including poor success rate, awkward to use, greedy on disc space and overpricing.

ALIGNMENT PROBLEMS?

1541 PHYSICAL EXAM

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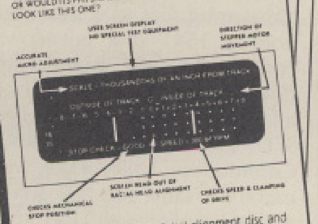
IS YOUR 1541 HEALTHY?
OR WOULD ITS PHYSICAL EXAM
LOOK LIKE THIS ONE?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SCREEN READ OUT OF RADIAL HEAD ALIGNMENT
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The program includes a digital alignment disc and software which allows you to **accurately check and correct** disc drive alignment. The instruction booklet is **very detailed**. Also includes quiet drive stops to **stop** that "hammering" thus preventing further problems.

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Get a **QUICKDISC+** cartridge plugged into your '64 and your 1541 will really **start to perform**. So many features per pound (sterling) that you will hardly believe it. Includes the following ...:

Fast LOAD (four to five times normal speed). Works with majority of protected software. Can be switched in and out from the keyboard.
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Fast Format takes just 20 seconds.
Fast Backup copies an entire disc in four minutes. (Not heavily protected software.)
Fast File Copier for selective fast copying.
Improved DOS commands (DOS 5.1) makes for easy use of the disc drive. e.g. $(RETURN) will LOAD and display a directory without overwriting BASIC. SHIFT RUN/STOP will LOAD "0:*",8,1 etc. etc. very very useful.
Incorporates Centronics Printer software (user port) **with CBM graphics** capability. See "Commodore Connexion" for suitable lead.
A RESET switch is fitted. (We have found this to be "unstoppable", it also preserves the tape buffer.)
NO MEMORY IS USED by this cartridge. It is totally "transparent" and uses special switching techniques.
"128" compatible in '64 mode.
Now the price. No not £49.95, it's **not even half** that much.
Can you afford to be without QUICKDISC+

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No extra connections are necessary with QUICKDISC+ and unlike most similar products it is compatible with printers and second drives.

Disc-Disector

DISC DISECTOR V4.0

Now the **fourth generation** of the countries **leading** disc back up/utility package is available. Various improvements have been incorporated to re-establish "Disc Disector" as the **ultimate weapon**. Of particular importance are the following.

"Evesham Turbo Nibbler" is the **latest version** of the infamous "Evesham Nibbler" now boasting **even more power and speed**. Will now copy even the most highly protected discs in **3–4 minutes**. Handles all the latest types of disc protection **completely automatically**. At the time of going to press this program copied **every disc program available for testing** including the latest in games and business software.

"Dual Driver Nibbler" allows the use of two drives to make **even faster back ups**. Incorporates device number change software so no hardware mods necessary.

"Nova Transfer" will **transfer to disc** the latest Nova Load programs including **multi stage loaders**. A very useful utility that is of particular use for the programs that need to load more information as the program progresses.

As well as these important newcomers all the old favourite utilities which have helped earn "Disector" such a large following are included. These include **Menu Maker (selective)**, **Fast Format**, **Unscratch**, **Disc Monitor**, **Disc Orderly**, **Fast File Copy**, **Index**, **Index**, **plus several other useful utilities**.

The whole package is menu driven and has its own fast boot system built in for your convenience. Pays for itself the first day you receive it.

ONLY £29.95

Customers with earlier versions may return them along with a payment of £9.95 to receive V4.0

All programs are CBM 128 and 1570 compatible.

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HELLO SFD1001 — GOODBYE 1541!

In certain applications, a capacity greater than even the 360KBytes of the 1571 disk drive is required. Bill Donald looks at Precision's 1MByte SFD1001 drive

Precision Software decided that to fully explore and utilise the facilities offered by their mainstream products SUPERBASE and SUPERSCRIPT in certain applications a higher capacity was needed, greater than even the 360K Bytes of the 1571 drive. They looked across the Atlantic and found that 1M Byte Commodore SFD 1001 drive gave the capacity needed, and for even more intensive demands the 10 MByte ST10C hard disk was eminently suitable.

The SFD 1001 drive uses Commodore DOS version 2.5 rather than DOS 2.1 of the 1541, 1570 and 1571 drives, which means that it employs 77 tracks as opposed to 35 tracks. There are a total of 4,133 blocks free on a formatted disk, which gives a capacity of slightly in excess of 1 MByte. Command syntax is identical, the computer has no interest in what drive you have hung on to it, so no problems learning how to operate and live with it. This drive uses the PET IEEE interface method which is far the quickest yet found on any Commodore drives. Externally, the unit looks identical to the 1541 and it was only by placing alongside a 1541 that I realised that it was marginally larger in length (by less than 1.0 inch), the other dimensions remained unchanged. Since this unit is derived from the business machines genre of Commodore drives this surprised me, the old 4040, 8250 and 8050 were all large, weighty beasts

"A joy to use"

In use the SFD 1001 was a joy to use and I was extremely reluctant to see it go back to Precision, so much so that I bought it, (sounds like Victor Kiam with his Remington razors!). It fully supports BASIC 4.0 commands and after the 1541, boy is it fast! SUPERBASE and SUPERSCRIPT loaded into a C64 or C128 in just about 60 seconds, PGM files zipped in so quickly that at times I hadn't realised that the drive was finished. However the most notable saving came with the use of disks. Because of the increased capacity, I found that one SFD disk could equate to five 1541 disks and since there was no need to change the media in any way, by transferring files to a SFD disk from a 1541 disk cut down considerably the number of disks in circulation and released a large quantity for re-use! The SFD 1001 is supplied with a Commodore Utility Disk with much the same sort of material as that supplied with 1541, thus making file transfer, disk editing and software device number changes simple. This utilities disk covers the C64, C128 and the earlier PET machines, so it is fairly comprehensive.

The package from Precision includes an IEEE interface which fits into the expansion port of the C64 or C128 without obscuring the cassette port. This interface also includes a Centronics printer driver, so I found that I could run my Epson RX80F/T from the user port of either machine. An IEEE connecting cable is also included, watch out for this one when buying IEEE items, the cables are now in excess of £40.00 each so make sure that one is in with the price – they are not cheap!

Fellow PLUS/4 users are not, as yet catered for, although Precision did indicate that they would consider introducing an interface for the PLUS/4 if there was sufficient demand, so over to you PLUS/4 users (the PLUS/4 expansion port has 50 pins at a finer pitch than the 44 pins of the C64, C128 expansion port). This same interface also uses the Commodore DOS Wedge routine when it detects the controller is a C64, the location of this being $C000 which is out of the way of BASIC. All in all, the IEEE interface is a very useful piece of firmware in it's own right.

The ST10C hard disk drive is aimed at users with a severe demand on the applications software supplied by Precision such as a small business, club secretaries, private libraries, etc. So if you run a SUPERBASE system containing 10,000 records or need to write a book of 500 pages using SUPERSCRIPT then contact Precision. My use of this drive was limited to writing these words before your eyes with SUPERSCRIPT. It's speed at doing a spell check was astonishing, virtually instantaneous detection of the (numerous!) errors, and I seemed hard pushed at the keyboard trying to keep up making the amendments.

"Vast increase in operating speed"

Any drawbacks to the SFD 1001? Well none that I could find immediately, although I would expect that some protected software would make an objection to the IEEE interface. The CP/M option of the C128 did not want to work, presumably because of the structure of the memory map under CP/M, although I said earlier that for serious use of the CP/M option of the C128 the 1571 double headed drive was virtually mandatory.

The benefits of the SFD 1001 can be pointed to in three areas. The first is in operating speed, a vast increase which is particularly noticeable on applications that have frequent disk access. The second being storage capacity which can be measured in terms of fewer disk changes and, if you have a large 1541 disk library, the cost saving on purchasing further disks. The final point and perhaps not as obvious is that of hardware compatibility – most readers of CCI probably have more than one machine and the problem of being able to use the any of the peripherals is quite important, not least because of the cost. With the exception of my PLUS/4 and naturally my AMIGA,, the SFD 1001 performed flawlessy on the C64, C128 and VIC-20. I would mention in passing that the AMIGA does contain a highly intelligent disk controller circuit, so intelligent in fact that it can read and write 'GCR format disks, as Michael Caine would say "not many people know that"! Thus given a suitable software driver and a rehash of the connecting cables you could even interface an SFD 1001 to the AMIGA, alternatively you could be really silly and use a 1541 (ugh!).

The SFD 1001 is a drive that anyone contemplating the purchase of a 1570 or 1571 should look at without exception. Unless you have CP/M aspirations there is really no contest and the 1541 drive is simply swept out of contention. the cost/benefit ratio for this drive make it almost impossible to ignore for any serious Commodore computer user. The price of the SFD 1001 1MByte 5.25 inch drive including IEEE interface with integral Centronics printer driver and IEEE cable is £309.25 including VAT. As both an impressed reviewer – and satisfied purchaser I can recommend this drive.

TDI Modula-2 for Amiga

TDI Software Ltd, the Bristol based software house have recently announced their Modula-2 for the Commodore Amiga. In its Amiga form Modula-2 will offer a multi – pass compiler, a linker, and a Library with full interface to the Amiga's system software including graphics, menus, mice, windows and several demonstration programs.

Modula-2 is a language designed to encourage the user to write in modules. Thereby making software easy to design, write and maintain. Pascal programmers, in particular, should be able to learn the language in two days.

TDI Modula-2/Amiga is immediately available from TDI Software for £99.95 inclusive of VAT and P&P. TDI can be contacted on 0272 742796

MPS-801 Descender

The latest product from that hotbed of activity, MPS software, is a true descender ROM for the Commodore MPS-801 and Seikosha GP-500.

By completely redesigning the character set and then blowing it into chip form, MPS have created a much more pleasing effect that really does make a difference in the legibility of your printer.

Fitting requires no technical expertise whatsoever and should take less than 10 minutes.

Descender ROM costs £14.95, and you can get hold of it from MPS Software, 36 Alexandra Grove, London N4 2LF. Tel: 01-800 3592.

Indepth on Indev

Information Developments (INDEV), is a new company just started by software expert Robert Harris. Harris is associated with products for mini-computers or PC's, it is therefore suprising that INDEV's first product is for the 64, but as MR White puts it "we had a couple gathering dust...".

Blinker-64 is this product, and a very interesting sounding one it is too. If you're interested in basic programming then it could be a must. Those of you who are used to assemblers will know that a linker is used to join different modules of code into one program, well Blinker-64 does this for basic. Not to be confused with little programs which let you merge two programs, Blinker will allow you to use your favourite subroutines just by linking them successfully everytime.

Available almost immediately, and suitable for anyone who has a 64 and one or more 1541's (phone for details of 128 and 1570/71) – it really means that you can write many small routines each doing something separately, then let Blinker join them. It will do all the renumbering, and even allow you to append data statements and machine code on later.

A full review of this novel and useful sounding product soon, meanwhile contact R. Harris for further details on: 07372 22755.

Credit Card Memory

Cumana, better known for their disk drives for the BBC and QL are announcing a step forward in memory storage (or that's what they say). The Astron Integrated Storage Device, a product developed by Astar International, is a solid state memory device in a credit sized card.

Although I have not yet seen them working, by this time next month I should be able to report on how everything is getting on, and more importantly how and whether they work! Watch this space.....

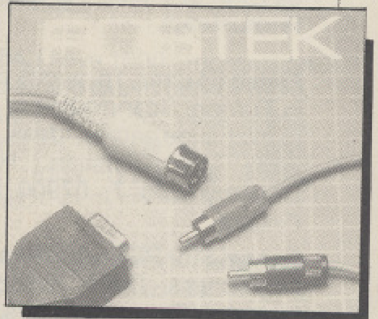
Demodiscs from Olivetti

All you Commodore PC owners out there will be interested to hear that Olivetti, in all their wisdom, have released a new label in floppy disks. Demodiscs are the same Diaspron disks Olivetti usually sell except that each disk from a box of 10 has a demonstration of a leading PC software package.

This gives users the opportunity to look at packages they may otherwise not bother with, and compare them to what they are currently using. Having looked at the Demos, the disks can be used as normal.

Some of the demos you get include; Wordstar 2000, Supercalc 3, GEM (Digital Researches mouse environment) and Word (Microsofts WP).

Contact: Olivetti on 01-785 6666.



128 Help

All you 128 owners who suddenly found out they need a £300 Commodore 1901 to make the most of the machines potential will be very relieved to hear that ROBTEX, formerly ROBCOM, have produced an interface to allow you 80 columns for only £14.95. You can also switch between 40 and 80 columns by pressing a switch.

For more details contact: ROBTEK, 36 Market Place, Fallonden Way, London, NW11 6JP. Tel: 01-209 0118.

More from Microlink

Microlink, a part of Telecom Gold, has just announced two new services of possible interest to subscribers. First is Weatherlink. This allows all you budding Ian McCaskills out there to receive the official satellite pictures of our country beamed from space. Using special software you can then turn that data into pictures.

Launched in February Microlink say (and I quote!) "you will be able to predict sunshine or showers with all the accuracy of the men from the Met office", come on! If they can't do it, how are we supposed to??

The second new service Microlink offer is Floralink. Although we have let you know too late for St Valentines day, this service means that subscribers to Telecom Gold can order flowers around the clock, and get them sent via Interflora's network of 2,700 stores in England and Eire (though not on Sundays!).

All budding Romeos who want to 'say it with Roses' but have grown too attached to their computer should contact MicroLink, quick! On 061-429 8451.

Commodore 64 disk drive printer. Easy Script, Easy File, Intro to Basic, Six game disc, all books, manuals. Delivery or postage included. As new. Items sold separately £450 o.n.o. Tel: 03552 26783.

Norwegian CBM 64 owner wants to swap software with everybody. Swap tape or disk. Send list to: Lars Goran Dorum Ostmoe, Gundrosensvei 5, 1600 FREDRIKSTAD, Norway.

CBM 64 C2N cassette, 1520 plotter, Simons Basic, Entrepo Quick Datadrive, software and magazines. V.G.C. £300. Phone 0442 67373 after 4.00pm. (Hemel Hempstead)

Finish 64 user, 16, wants penfriend in Europe, Scandinavia or England to exchange games, ideas, tips, etc. Write to Christian Hanninen, Degerbynkatu 7, 07900 Lousiisa, Finland.

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C64 1541 disc drive, Quickdisk +, Datasette, Simons Basic, Softchip, Easyscript, Flight Simulator II, Music Construction Set. Many disk and cassette games etc. £270 o.n.o. Tel: Chelmsford 442026 after 7pm.

Prism 1000 modem with OEL comms cartridge and Prestel Mustang software (disc) £55 o.n.o. Phone evenings 0793 481886.

Wanted 1701 monitor. Will pay up to £100 for one in good condition. Tel: 0354 56378. Ask for Stan. Eves only.

CBM MPS 801 printer for sale. £90 also complete home computer course + advanced course to date + binders £50. Send cheque or P.O. to 20 Castle Walk, Hyson Green, Nottm NG7 6DZ.

VIC 20 intro to Basic pt.1.£8. Book on VIC programmes £2. 16K switchable ram pack £28. Cartridge games £3.50, 2 expanded games £1.50 each, un-expanded £5 or £1.50 each. Ring: 449 9240 (evenings).

Commodore 64 computer plus 1541 disc drive £250. Interpod, Interface £30. Tel: (0992) 444640.

Brother M-1009 centronics parallel dot-matrix printer. True descenders. Nearly brand new. £130. Trippler I/face. Link 20/64 computer to any Centronics printer. No software needed £30. Phone Terry on Luton (0582) 2370.

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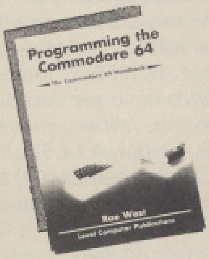
VIC 20. Many cassettes and cartridges. C2N, Super Expander, Intro Basics 1 + 2; Programmers Reference Guide; Games Book; £80; all v.g.c. Tel: Ruskington (Lincs) 833736.

CBM 64 Poke Sheet. Has pokes and tips on top games like Underworld, Dropzone, Monty on the Run, Who Dares Wins 2. Send 30p + S.A.E. to: S.C. Moore, 68 Lightridge Rd, Fixby, Huddersfield HD2 2HS.

COMMODORE 64 OWNERS
The Ultimate Reference Book



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by Rae West

Comprehensive and readable teaching and reference book on the 64. Takes over where Commodore's manual leaves off. Much larger than most computer books. Programs available separately on disk or as pack of 2 tapes – saves keying time.
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By using a unique user programmable battery Back-up ram cartridge, trilogics tape to disk system will transfer most programs from tape to disk. The operating software is downloaded from disk so not only can you use the module or tape to disk, but also to emulate most rom based programs simply by loading in the appropriate software from disk. You can even use it as your omma customised kernal rom emulator , etc etc.

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CBM 16 Starter Pack £30, joystick £3, various software. Half price. To: Ms B. Rochelle, 89 Marine Drive, Colwyn Bay, Clwyd.

Modem CBM type £35. Tel: 0705 486738. After 7pm.

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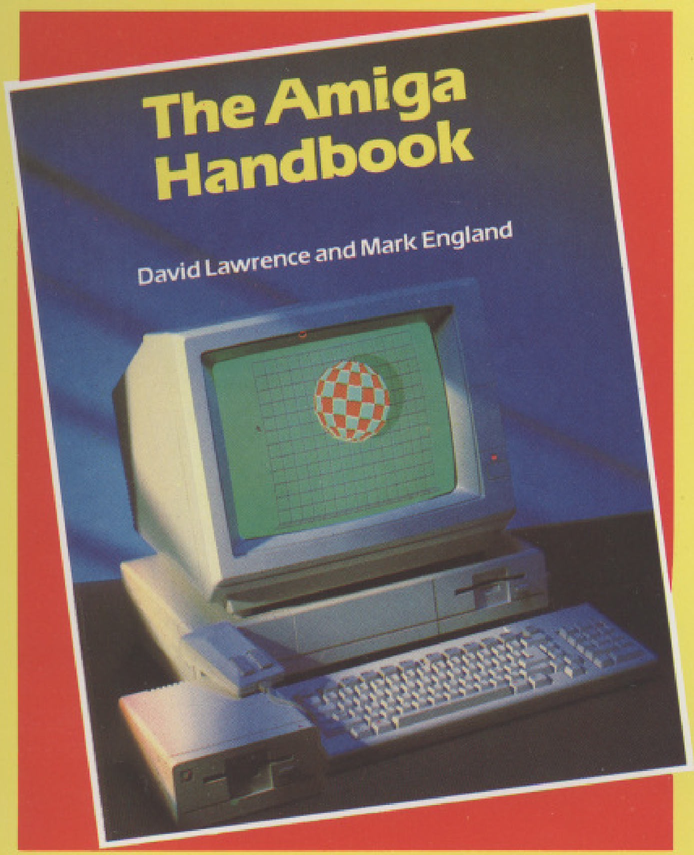

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